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TELEPHONE ENGINEER

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VOL. XXI CHICAGO, APRIL, 1919 NO. 4

The Independent Convention in June

ALMOST thirty months ago there was considerable informal discussion as to the most desirable date for holding Independent conventions. There was no decision. Eighteen months passed before the Independents held another "annual" meeting—a year and a half of war and worry and stringent restriction. The 1918 convention was held in June because the anxious operators could wait no longer for the comfort of friendly, understanding intercourse.

With the announcement issued this year by the directors of the United States Independent Telephone Association, June appears to become established as the telephone convention month. The 1919 meeting is to open June 24. The place, as usual, will be the Hotel La Salle, in Chicago. The event, it is safe to say, will be charged with greater interest than the telephone business has manifested for many a year.

It has always been safe to promise that attendance at an Independent convention would make a telephone man a better operator. This time, however, we can go so far as to say that attendance is absolutely essential to the efficient conduct of an operating telephone plant. Before the operators have a chance to meet again the government will have returned their plants to them. There is even a possibility, perhaps a probability, that private control will have been restored before the convention. What telephone man, however astute, can say that he needs no counsel in handling the problems of that day? Who is able to affirm that the men who have spent months of long-houred days in close study of the complications occasioned by the unprecedented situations of the year can tell him nothing?

Not for years has there been any danger that the telephone business would abuse that much overworked term, "optimism." But if the telephone situation ever called for an honest application of the word, it is now. Operators will get their properties back. Rates have been raised, or the way to raise them has been made clear. Service has deteriorated just enough to make the public sincerely appreciative when it is restored to the old efficiency or better. Technical improvements have gone on in spite of war, or in many cases because of war. Agreements with competing Bell companies are no longer one-sided. Altogether the future of the industry looks brighter now than it has for many a long year.

All of which are compelling reasons for coming to the convention in June.

Paying for Service Rendered

NONE of our readers needs any information we can give about the Victory Liberty Loan. Of course, coming in the midst of after-war relaxation, the emotional appeal is lacking. That is one of the things for which we should now be glad to pay—the fact that the period of emotion is ended. As business men, we are accustomed to paying for service after we have used it. To some extent we are doing just that when we buy bonds of the fifth issue. We are simply paying the bill, or rather the last installment of it, six months after the experts delivered the goods in the shape of a capitulation by our ruthless and militant competitor. Perhaps if the telephone men, to whom this is all commonplace enough, can help their employees to see it in that light, there will result an even more generous subscription than is anticipated.

Bureau of the Census Telephone Report

Over Eleven and a Half Million Telephones in United States

THE number of telephones in use in the United States at the close of the calendar year 1917 was 11,713,228—one to every nine persons, or every two families; and the number of calls made during the year is estimated at 21,842,000,000, an average of more than 200 for every man, woman, and child in the country. These are among the interesting features of a preliminary report on the telephone industry of the United States, just made public by Director Sam. L. Rogers, of the Bureau of Census, Department of Commerce. This report was prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures.

In addition to statistics for 1917, the report presents comparative figures for 1912 and 1907, with percentages of increase. The statistics for 1917 cover the Bell Telephone System—comprising all lines operated by the American Telephone and Telegraph Company and its associated companies; independent telephone systems reporting annual incomes of more than $5,000; and Independent telephone systems, including rural lines, reporting incomes of less than $5,000. They do not, however, include data for telephone lines maintained by steam and electric railways for use in connection with the operation of their roads; private lines in hotels, factories, etc.; or lines operated by Federal, state, or municipal offices.

Considerable increases are shown for both five-year periods, 1912-1917 and 1907-1912, covered by the report. The increase in the amount of business done was considerably greater during the later five-year period than during the earlier, but the increase in the wire mileage and the number of telephones was proportionally, though not absolutely, greater during the earlier period. During the five-year period 1912-1917 the number of systems or companies increased from 32,233 to 53,035, or at a rate of 64.5 per cent, as against 40.3 per cent for the preceding five years. The wire mileage increased during the same period from 20,248,326 to 28,827,091, or by 42.4 per cent, as against 55.8 per cent for the preceding five-year period. The number of telephones increased from 8,729,592 to 11,713,228, or at the rate of 34.2 per cent, as compared with 42.3 per cent for the five years 1907-1912. The estimated number of messages or talks increased from 13,736,000,000 to 21,842,000,000, or by 59 per cent as compared with 20.8 per cent for the five years preceding. The total number of employees in 1917 was 262,622, an increase of 43.2 per cent as compared with 1912; and their salaries and wages aggregated $175,668,299, an increase of 82.9 per cent over the 1912 figure. The income from all sources in 1917 amounted to $391,476,926, an increase of 53.5 per cent over 1912; and the expenses and fixed charges were $319,116,293, or 56.6 per cent more than in 1912. The total value of plant and equipment in 1917 amounted to $1,492,230,081, an increase of 32.8 per cent as compared with 1912. For the ten-year period 1907-1917 the percentages of increase in the more important items covered by the table were: Salary and wage payments, 57.3; expenses and fixed charges, 126.6; wire mileage, 121.8; total income, 112.2; number of messages or talks, 92.1; number of telephones, 91.4; number of employees, 82.2; value of plant and equipment, 80.8.

The Bell Telephone System reported, for 1917, 62.6 per cent of the total number of telephones, 80.3 per cent of the total wire mileage, and 76.4 per cent of the total value of plant and equipment. In addition to the 7,326,862 telephones directly owned by this system, there were 3,164,902 independently owned telephones which were connected with the Bell lines and exchanges for the interchange of local and long-distance service. The Bell service, therefore, reached 10,491,764 telephones, or 89.6 per cent of the total number reported.

The figures are shown in detail in the accompanying table.

Speed

Company E of the 413th Telephone Battalion claims the speed record in installing lines for the A. E. F. In the recent big push the men who wear their spurs nearer the angle than the heel set 136 poles, six stubs, placed 69 cross-arms, gained and framed two poles, three gains, strung and tied in two-wire circuit, a total of four and one-half miles of wire, dug 12 pole-holes in rock, dynamiting each hole and then called it a day. Forty men working accomplished this trick, and 39 of them did almost as much the day before.—*Stars and Stripes.*

TELEPHONES IN THE UNITED STATES AT THE END OF 1917.

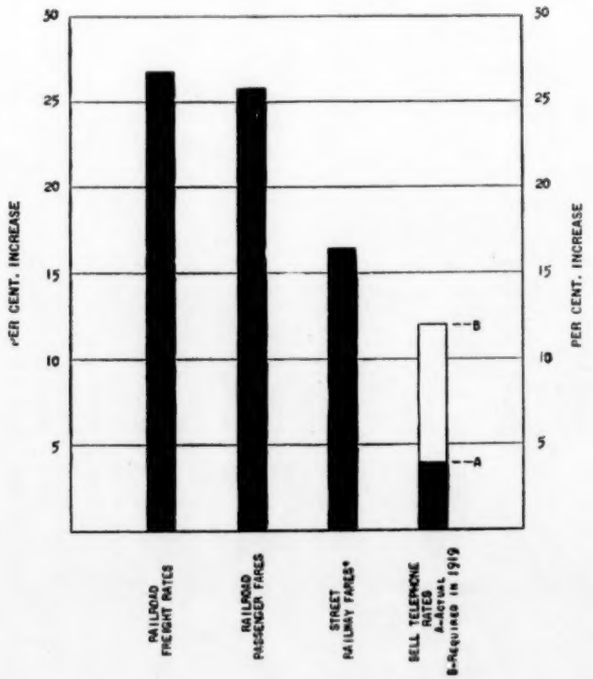
	1917				1912	Per cent of increase			
			All Other Systems.						
	Total All Systems.	Bell Telephone System.	Reporting annual incomes of $5,000 or more.	Reporting annual incomes of less than $5,000.	All Systems.	1907 All Systems	1907-1917	1912-1917	1907-1912
Number of systems and lines	53,035	145	2,055	50,835	32,233	22,971	130.9	64.5	40.3
Miles of wire	28,827,091	23,136,553	4,164,308	1,526,230	20,248,326	12,999,364	121.8	42.4	55.8
Number of telephones	11,713,228	(1) 7,326,862	2,626,852	1,759,514	8,729,592	6,118,578	91.4	34.2	42.7
Estimated number of messages or talks	21,842,425,620	14,597,594,929	5,211,493,216	2,033,337,475	(2) 13,735,658,245	11,372,605,063	92.1	59.0	20.8
Number of public exchanges	21,174	6,288	6,006	(3) 8,880	(2) 11,515	(2) 10,613	15.8	6.8	8.5
Number of employees	262,622	198,700	45,790	18,132	(2) 183,361	144,169	82.2	43.2	27.2
Salaries and wages paid	$175,668,299	$144,914,867	$24,740,199	$6,013,233	(2) $96,040,541	$68,279,127	157.3	82.9	40.7
Income from all sources	391,476,026	311,918,260	60,583,540	18,975,126	(2) 255,081,234	184,461,747	112.2	53.5	38.3
Expenses and fixed charges	(4) 319,116,293	260,783,288	52,319,772	(4)6,013,233	(2) 203,754,909	140,802,305	126.6	56.6	44.7
Value of plant and equipment	1,492,230,081	1,140,639,666	295,272,476	56,317,939	(2)1,081,433,277	(2) 794,096,971	80.8	32.8	36.2

(1) In addition to the 7,326,862 Bell-owned telephones, the Bell system reported 3,164,902 telephones of "All other systems" which were connected with its lines and exchanges for the interchange of local and long-distance service, making a total of 10,491,764 telephones.
(2) Exclusive of systems reporting annual incomes of less than $5,000.
(3) Number of systems reporting exchanges. Actual number of exchanges not reported.
(4) "Salaries and wages paid" is the only expense item included for systems reporting annual incomes of less than $5,000.

TABLE NO. 2

INCREASE IN BELL TELEPHONE RATES COMPARED WITH INCREASES IN RATES OF STEAM RAILROADS AND STREET RAILWAYS

Increase in Rates at End of 1918 over Rates in 1913



*Street Railway fares are measured by the average fare in all Cities of more than 40,000 population

Table No. 1 shows the increase in prices of commodities and the increase in average payments for telephone service from 1914 to 1918, inclusive. It also shows the effect of the proposed increase in rates for telephone service. By comparison with increases in other utilities, the average charges for telephone service by the Bell System have remained almost stationary, while the asked-for increase is relatively a slight one.

Table No. 2 is a very graphic picture showing the increases in rates for the service of utilities of necessity from 1913 to the end of 1918. The increases in the telephone charges have been about 4 per cent, and the increases which have been asked for and which are necessary to preserve the equilibrium of revenue and expenses would amount to less than 13 per cent, which compared to increases in all other commodities is almost negligible.

Table No. 3 is an interesting showing of the downward course of telephone rates relative to the general wage level. This shows by comparison a virtual decrease of nearly one-half in the existing rates, or if the rates asked for are granted the average rate would show, compared to wages, a virtual reduction of over 30 per cent. This diagram should be considered in close connection with Table No. 1 which shows the increase in wages and commodities, and also the actual increase in telephone rates and the increase now under consideration.—A. T. & T. Annual Report.

TABLE NO. 1

CHANGES IN BELL TELEPHONE RATES - 1913 to 1918
COMPARED WITH CHANGES IN WAGES AND PRICES

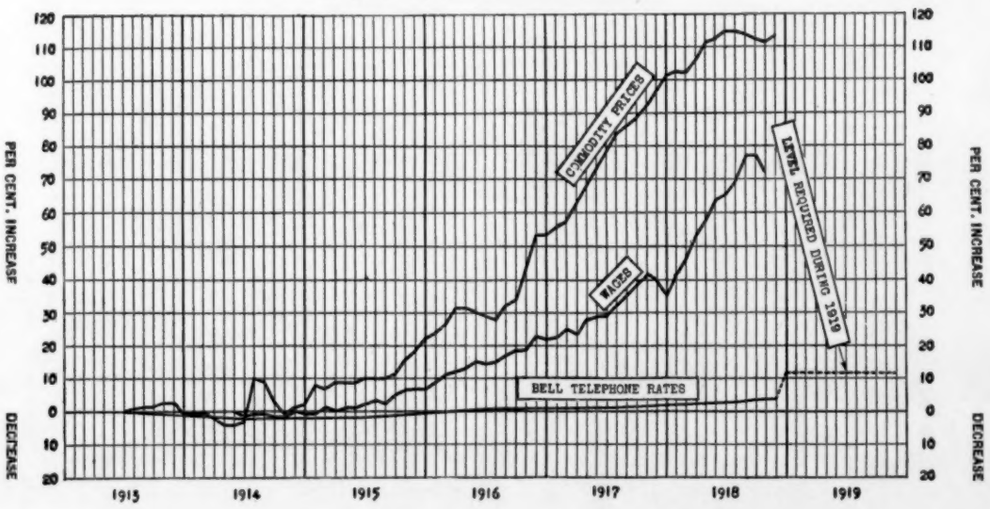
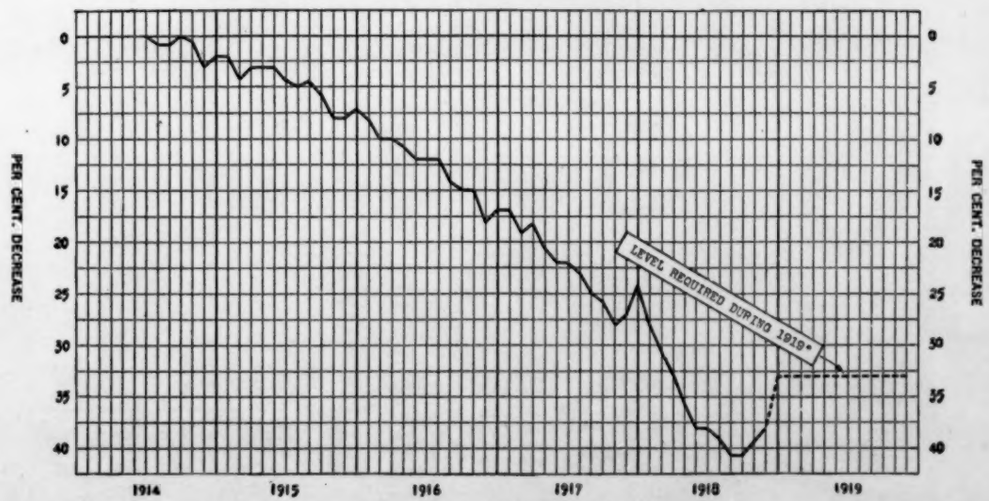


TABLE NO. 3.
RELATIVE DOWNWARD COURSE OF BELL TELEPHONE AVERAGE RATES, 1914 TO 1918
EXPRESSED IN TERMS OF PURCHASING POWER OF MONEY AS REFLECTED BY WAGE LEVELS



*ASSUMING FIXED GENERAL WAGE LEVEL DURING 1919

Strong Meeting in Texas

The principal work of the convention of the Independent telephone men of Texas during both morning and afternoon sessions of the annual convention March 13 at Dallas was the discussion of Federal control of the telephone properties, led by E. C. Blomeyer of Waco, secretary of the association and district supervisor of Independent telephone lines under the United States Telegraph and Telephone Administration for the state of Texas. The meeting opened at 10 o'clock with a talk by Mr. Blomeyer, in which he outlined the organization of the wire administration under the postmaster general, beginning with the resolution enacted last July by Congress authorizing the President to take over the telegraphs and telephones, and covering the orders with reference to the operation of telephone and telegraph systems that have been issued by the postmaster general down to date.

"The big question before the telephone companies of the country just now," said Mr. Blomeyer, "is the situation in which we will be left with the return of the properties to private control. The Moon bill, which was intended to make definite the time of the return of these properties to their owners, was crowded out in the rush of bills in the late Congress, and failed of passage. The bill would have terminated Federal control of the wires on December 31, 1919. As the matter now stands, the wires will return to private operation upon the proclamation by the President of the ratification of treaties of peace. The business before us now is to so adjust our business that, upon its return to our own hands we can carry it on without loss of efficiency to ourselves or failure of good service to the public."

The principal matters of interest evidenced by the telephone men who asked questions of the speaker, was the interpretation of orders that have been issued for the operation of their business. Many questions were asked concerning the bulletins and orders that have been issued, and were answered by Mr. Blomeyer as district supervisor of independent properties for the state. The principal subjects of discussion were the orders imposing installation and moving charges for telephones installed or moved, and the standardization of toll rates effective throughout the country on January 21, 1919.

"Both these orders are fundamentally sound and correct, as an operating proposition," said Mr. Blomeyer. "Whether these practices are to be continued after the properties return to us, is a question that must be settled later, but one to which telephone men should be giving attention now."

Mr. Blomeyer said that no evidence of any serious hostility among the telephone men against the rule of the postmaster general had been shown during the convention.

"The telephone people are mostly concerned with the proper methods of applying these orders," he said, "and the independent companies of Texas have shown entire good faith in co-operating throughout with the orders issued by the Telegraph and Telephone Administration.

"The telephone properties have not been scrambled, nor has the identity of any company been destroyed by Federal control. We will have no serious difficulties in resuming operation under private management, with the exception of the decisions to be made on operating practices established during the last few months."

Telephone men were opposed to government ownership, said Mr. Blomeyer. That question is now practically a closed issue. The principal question now, he said, is the length of time the present Federal control of the properties will continue, and methods of operation after that time.

Sessions on government control were held both morning and afternoon. During the morning Captain W. S. Vivian of Chicago, secretary of the United States Independent Telephone Association, who has lately returned from telephone work in France, discussed the matter of compensation contracts between the government and owners of telephone properties. W. C. Freeman of the Stromberg-Carlson Company of Rochester, N. Y., delivered an address on the manufacture of telephone equipment, illustrated with lantern slides.

Matters of state legislation and bills now pending before the Texas legislature and of interest to telephone men, were up for attention. Resolutions were adopted advocating certain amendments to the minimum wage bill, in order to make this measure apply to the wages of telephone operators in such a manner that it will not be necessary to pay the same wages in the smaller towns as are ordered to be paid in the larger cities. No discussion was held on the Dorough public utility bill, this being left for the session Friday.

The telephone men and the women attending the meeting were given a banquet at the Adolphus Hotel as guests of the manufacturers, dealers and the larger independent companies of the state. About 250 guests were present. Short talks were made by officers of the organization and the prominent independent men of the state.

That 244 telephone exchanges and 110 telegraph offices were erected and put in operation in France by the A. E. F. before the end of the war, was the statement of Captain W. S. Vivian. Mr. Vivian's story of the telephone activities of the Americans in France was very interesting and at times exciting. He said that 20,000 miles of telephone circuits were strung by the Americans in France before the armistice was signed.

An educational address, illustrated by lantern slides, was presented at the afternoon session by Kurt C. Barth of Chicago, expert on the treatment of telephone poles and cross-arms with chemical preservatives.

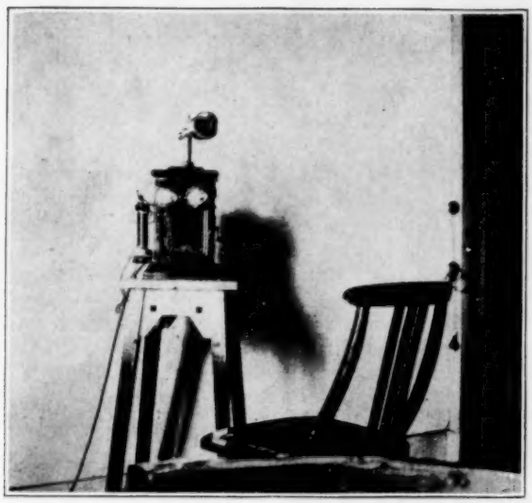
E. C. Blomeyer, of Waco, was elected president for the ensuing year. Other officers elected were A. J. Combe of Haskell, vice-president; J. Y. Rust of San Angelo, vice-president; F. W. Greber of Brownwood, secretary; L. S. Gardner of Waco, assistant secretary, and Oscar Burton of Tyler, treasurer.

The following directors were appointed: Joe Grimes of Gladewater, John A. Stratton of Dallas, R. B. Still of Tyler, E. G. Ferrenbaugh of Llano, Stanberry Alderman of Big Spring, C. A. Schoch of Sherman and C. D. Longseere of Bardwell.

The place for holding the convention next year will be decided by the officers some time during the present year.

Japanese Radio Telephone Progress

An exchange to connect wireless and wire telephones was established in Kobe, Japan, about the first of the year by the Government Department of Communications, states *Wireless Age* in a recent issue. A wireless tower 180 feet high is now being erected in front of the largest of the Kobe telephone exchanges. Wireless telephone messages from vessels within 100 miles of the South Japan port will be connected by central operators with the telephones of subscribers in Kobe, Osake, Kyoto, and neighboring cities, thus serving the most densely populated section in Japan.



The Kind of Telephone Found in the Rooms of a Japanese Hotel.

Pole Setting Used in Shanghai, China; Devised by the Telephone Manager.

Typical Distribution Line Construction, Tokyo, Japan.

Market for Telephone Goods in Asia

Extracts from Special Agents' Series No. 172, Department of Commerce

1. Telephone Equipment in China

IT is difficult for a foreigner to obtain a franchise to operate a telephone exchange in a Chinese city, though there is nothing to prevent such ownership and operation where the service is confined solely to an international settlement or concession. Again, while it is theoretically possible for a Chinese to obtain a permit from the minister of communications at Peking to operate an exchange, it is difficult to get such a permit, as the policy of the ministry seems to be toward government ownership of all communication facilities. Under the conditions that exist, there are four classes of telephone exchanges in the country, as regards ownership: (*a*) Those owned by the central government at Peking; (*b*) those owned by provincial or state governments; (*c*) those owned by private Chinese companies; and (*d*) those owned by foreigners.

The central government operates a number of telephone exchanges and a few stretches of toll line in China proper and South Manchuria, an 80-mile line between Peking and Tientsin being one of the most important. The largest exchange operated is that at Peking. All telephone and telegraph work is in the hands of the Ministry of Communications, and the department is not only averse to granting permits for the establishment of exchanges by others than itself but is buying up desirable properties as fast as it can finance the purchases. Telephone men in China state that the central government would take over all telephone exchanges and grant no further permits for private plants if it were able to obtain the money necessary to carry out its policy.

The various provincial (state) governments operate a number of plants, the largest of which is at Changsha in Hunan Province. There are also a number of exchanges operated by private capital. One of the important cities with a privately owned Chinese exchange is Canton.

In the fourth class, where the ownership is foreign and the system operates within foreign settlements, there are probably a half-dozen exchanges, of which the one at Shanghai is by far the most important. The others are very small and more on the order of outdoor inter-communicating systems, which have been installed as a matter of convenience rather than as financial undertakings.

Most of the exchanges are magneto systems and the volume of business is in that type of equipment, though there are a few common-battery systems. In the future it is expected that for some years the greater percentage of the work will be magneto multiple with lamp signal supervision. In cases where magneto systems will be replaced, engineers, both private and government, believed that regular manual common battery systems would be adopted. They did not feel justified in taking up an automatic system in view of the extreme humidity in China. There is an opportunity to show that the automatic can be operated satisfactorily by arranging to install a small exchange and operate it for a short period, turning it over to the government at the end of the period of satisfactory operation. The government engineers did not appear to be antagonistic to the system, but they were frankly skeptical as to the possibilities of such a system operating well under their climatic conditions.

The outside construction of telephone systems in China is mainly overhead, with a large percentage of open wiring. Aerial cable is being employed to an increasing extent, however. In the matter of poles, etc., the situation is the same as was outlined in the discussion of distribution systems for central stations. Poles are cheap at points close to source of supply but relatively expensive in remote districts where transportation facilities are still primitive. Cross arms are used more than in power work, as would be expected, and brackets are employed only where a few lines are carried. Porcelain insulators are used practically to the exclusion of any others.

There is practically no toll-line development in China as yet, for two or three outstanding reasons. In

the first place, the government, which under the existing ownership conditions is alone able to carry out a general toll-line scheme, has already a quite complete telegraph system connecting the cities where toll lines would be most desired. If toll lines are built the Ministry of Communication fears that the earnings of the telegraph system will drop off very much, while in many cases, on the other hand, there will for some time be hardly enough toll business to warrant the construction of toll lines. The two cities that would probably be the first to be connected and appear offhand to warrant immediate construction are Peking and Shanghai. While the government owns the exchange at Peking, the system at Shanghai is operated by a mutual company, foreign controlled, and arrangements satisfactory to both parties have not been possible so far. Naturally the building of a line and the installation of a few long-distance stations at the Shanghai end would not result in satisfactory service or considerable earnings. The Chinese government owns a little toll line out of Mukden, and native merchants also own and operate lines connecting Mukden with surrounding towns. In addition, the Japanese government, in the name of the South Manchuria Railway Company, has built up a toll system in South Manchuria and has lines connecting Dairen, Mukden, Port Arthur, Fushun, Penhsihu, Kaiping, Newchwang, Changchun, and other towns in that territory within or near the South Manchuria Railway zone.

Prior to the war American, German, British, and Swedish manufacturers were strongly in the market with Japanese makers also competing, especially in South Manchuria.

In exchange equipment and in telephone instruments the German Siemens Company was very active in working for the central government business and is openly accused of "squeezing" to secure favorable contracts. It was doing a fair amount of business when the war opened. The Swedish Erickson Company had most of the business in Canton, Hongkong, and Shanghai, in addition to other less important customers, and was a very strong competitor. Purely British companions did not do a great deal of this class of business, the British Insulated Wire & Helsby Cables Company being one of the strongest in the field; but an American company sold a considerable amount of equipment and material made in its English branch factory. This American company also sold equipment made at a continental branch factory.

Since the war began, competition from Europe has dropped to practically nothing, and the United States and Japan are furnishing the market, with some Swedish and Norwegian goods coming in. One American company is selling boards and subscribers' sets made in its Japan factory, and other Japanese goods are being pushed. Notwithstanding the cheap labor of Japan, American telephone manufacturers can turn out instruments as cheaply as that country. At present it is said that if American manufacturers could make delivery they could take all of the business.

Owing to the trying climatic conditions, which cause nickel plating to scale badly, one telephone manager suggested that a lacquered-brass finish for instruments, in place of the nickel, would work out very well. The Chinese can refinish such instruments, but have no facilities for taking care of nickel-plating work. The instruments used by this company, in all cases noted, had lacquered-brass finish, and he was able to speak from his own experience. However, the brass was generally badly tarnished in instruments observed in service.

Certain foreign houses in the China trade have recently been trying to employ German "squeeze" methods of securing business from the central government. In one case not long ago an American company was the low bidder, but instead of giving the business to it the Chinese official in charge of the matter gave the American figures to another bidder and placed the contract with him at about the American figures. The American company, which was on the watch for such tactics, carried the matter to headquarters and gave it such publicity that most of the business was finally given it, with some to other bidders.

With normal conditions reestablished, it is believed that American telephone manufacturers will be able to compete readily for exchange equipment and subscribers' sets in the China market. Sweden should be the strongest competitor on a quality basis, while Japan will come in with cheaper goods. The strength of Germany's position in the market will be greatly affected by defeat. Its trade prestige was based largely upon fear, and the decisive defeat of Germany in the war will result in its "losing face" with the Chinese, who had been taught by the Germans that the Teutons are a superior race. While American instruments before the war cost about the same as the Swedish sets, it was said by officials connected with a large exchange that American switchboards were a little higher in price than Swedish, amounting to as much as 10 per cent. This occurred at a time when costs in the United States were abnormally high.

In intercommunicating telephones there is not much business open, though a campaign of education will, it is believed, show good returns. The only outfits seen were the British Sterling make, and for a five-point set the instruments cost $32 Mex. c. i. f. Hongkong in the spring of 1917. A Chinese dealer stated that in pre-war times Siemens (German) sets for 10 stations cost $19 Mex. each. American sets of this kind are far superior to the foreign makes.

Before the war British and German cable held the market in China, an American company represented in China selling cable made in England, as British prices were said to be lower than American. One of the largest users of cable in China stated that American prices were generally 10 per cent above those of British and German makers. On the other hand, an American telephone engineer in China said American manufacturers could compete with other makers of telephone cable. From a knowledge of relative prices quoted in competition in other countries, however, it is not believed that American manufacturers can compete in this line unless some cooperative plan of buying of materials and of selling abroad is adopted. Since the war began Japan has been selling practically all the lead-covered cable used in China, and the Danish engineer in charge of the central Government telephone systems stated that it fulfills the specifications both mechanically and electrically, and is in general good cable.

A practice of German cable manufacturers may be of interest. As the cable was leaded, they stamped the measurement in the sheath at intervals of a few meters. This was very convenient, as in that way the amount of cable left on a reel could be determined at a glance. The plan is simple and might be adopted by

American manufacturers. No sheath breaks have been traced to such stamping, nor has any other trouble resulted from it, and in China the high humidity makes the conditions for cable operation severe.

In other classes of line materials, besides cable, American manufacturers can furnish such items as steel pins and pole hardware to some extent, though much will be made up locally. Insulators will be furnished by Japan, with a strong probability that the Chinese Ministry of Communications will ultimately arrange for their manufacture by Chinese potteries. American manufacturers should be able, however, to do considerable business on pole cable terminals, junction boxes, protectors, etc., it is believed.

Japan will probably be a serious competitor in switchboard cords, etc., as it is giving satisfaction in these lines, apparently, where Japanese goods have been used. At Shanghai a special type of Japanese-made jumper wire was being used. The wire was enameled first and then rubber and braid covered in the usual manner. In the No. 20 S. W. G. (standard wire gauge, British) size this wire cost 3 tael cents per yard prior to the war; in June, 1917, the same wire cost about 6 tael cents per yard. Prices are c. i. f. Shanghai with duty paid.

TELEGRAPH EQUIPMENT.

The telegraph system of China is operated by the government under the control of the minister of communications and is generally conducted in connection with the telephone system. There is no likelihood of any lines being built by private companies. Statistics of the telegraph system as given by Mr. Eriksen, the Danish engineer in charge, show 40,016 miles of pole line erected, 1,002 miles of submarine cable, 102 miles of underground cable, 1,916 Morse instruments in service, 29 Wheatstone instruments, 659 telegraph offices, 8 foreign employes, 5,922 Chinese employes, and 3,282 operators. These figures were given the writer at Peking in November, 1917, as the latest available, but are not up to date.

As for line construction, No. 8 B. W. G. (Birmingham wire gauge), B. B. ("best best;" the highest grade is "extra best best") iron wire is used mainly and 5-inch top, 28-foot poles are set to carry two or three wires, while those for four to six wires have 6-inch tops and 9-inch butts. Brackets and porcelain insulators are used to a large extent to carry the wire, but wooden cross arms are being employed to an increasing extent. The insulators are about 2.5 inches in diameter by 3 inches in height, with a "swan-neck" iron bracket lag-screwed into the pole.

The method employed in sending Chinese characters is interesting. A number code is used and the characters listed total between 9,000 and 10,000, each character with its number. It was said that the Chinese operators become so familiar witht the code that they will send without consulting the code book. When one considers that a knowledge of two or three thousand characters is necessary to be able to read a newspaper in China, it is evident that the ability to remember at least this many numbers corresponding to characters is quite a feat.

In the past most of the telegraph equipment used on the government system has been either Siemens (German) or Great Northern Telegraph (Danish). The foreign supervision of the telegraph system is made up mainly of engineers formerly connected with the Great Northern Telegraph Company, a Danish cable company that has been operating in the Orient for many years, and that in addition to being an operating company also makes a line of instruments. Naturally these engineers favor European goods. Very little in the telegraph line has been bought in the United States.

At present the government is not buying instruments to any extent, but is making up a Siemens pattern set in its own shop, buying relays and doing the rest locally. The cost of the instruments in that manner is considerably below their former price and the practice will probably be continued unless patent difficulties should prevent. In other lines the Japanese are getting the business, underbidding on cable and supplying it in full accordance with the specifications, it was said. The insulator and "swan-neck" bracket units used come from Japan, and with a 2.5-inch diameter by 3-inch high porcelain insulator; the complete unit cost in pre-war times, 28 to 29 cents Mex. c. i. f. Shanghai.

Except possibly in magnet coils and a few special fittings built to specification, it is not probable that American manufacturers will be able to get any amount of telegraph business in China.

WIRE AND POLES.

Though Japan, with its home copper supply, can probably give serious competition, American makers should be able to do a little business in the wire line, if they go after it in earnest.

China has three regular sources of supply for wooden poles—its own limited and rapidly diminishing forests, Borneo and Japan. Some line supports come from the United States. Chinese poles are very slim and are obtainable in some localities as long as 50 feet, though with tops as small as 4 or 5 inches in some cases. Transportation is the factor that determines prices at points distant from the place of cutting; this is a serious problem in China and results in widely differing prices. At Amoy the pole supply comes from a point about 30 miles from the city, and the poles are sent down the river easily. The 40-foot length is the more common here, and with a 6-inch top these cost about $6 Mex. delivered at Amoy. For 5-inch, 30-foot poles the price delivered at the city runs from $3 to $4 Mex., while a 60-foot spliced pole runs up to about $24 Mex. These poles have a small butt diameter—only about 9 inches for a 40-foot pole—and therefore do not have much margin for decay. Their life is not long, nor are they adapted to carrying heavy loads. Moreover, the native pole output is small. Therefore, at points where direct transportation is possible and in some other cases, wooden poles are brought from Borneo to South China and from Japan to North and Central China.

In Shanghai the chief engineer of the telephone company has developed a patented type of socket pole setting that works out very well. A structural-steel socket of square cross section, made up of four 2 by 2 by ¼ inch angles with diagonal lacing of flats, and similar to a section of a steel pole, is set in a concrete base. The average length of steel in the concrete is 6½ feet, with 2½ feet extending above the base. The base itself, which has a cored center, extends 18 inches above the ground, so that the net set is about 5 feet. The socket is 10 by 10 inches in section and into this set a sawed Douglas-fir pole 35 feet in length and tapered from 8 by 8 inches at the top to 10 by 10 inches at the butt. This construction seems to carry the lines

without trouble, notwithstanding the heavy winds that sweep up the coast periodically. The fir poles last about five years when set in the earth; set in this type of base, the life is at least seven years. A pole setting of this kind is illustrated.

Tubular steel poles are used to a small extent by one or two telephone exchanges and lighting systems. The market is therefore small and has apparently been supplied by Great Britain.

CROSS ARMS, INSULATORS, AND PINS—LINE HARDWARE.

Wooden cross arms are of native timber in many cases, sawed out by hand in Chinese "sawmills." The government telegraph system is employing wooden arms to an increasing extent, as against its former practice of carrying the wires on bracket insulators up and down the side of the pole.

Insulators are of porcelain, generally white in color, and are usually bought complete with pin and washer. In the past Germany, England, and the United States have sold in this market. Now, however Japan is doing most of the business. The type of insulator used for average low-tension and telephone work is about 3 inches high and about 2⅜ inches in diameter with about a ⅝-inch pinhole. An insulator, pin, and washer of this type cost from 36 to 45 cents Mex. at Shanghai warehouses of Japanese agents during the summer of 1917. A similar type of Japanese insulator for telephone work was quoted early in 1917 at about 4 cents United States currency delivered at Hongkong, and the pin for the same at about 14 cents United States currency, delivered. On a price basis the American manufacturers can not compete with Japan in normal times for this small-insulator business. Chinese potters are being taught to make insulators and there is no reason why they should not soon supply their own needs in the low-tension porcelain line. No data were available as to prices and no insulators were seen, but authoritative information was given that the Chinese are themselves begining to make insulators.

American steel pins would do well in this market if the makers would standardize for the pinhole diameters used in the market. The porcelain insulators used here have smaller pinholes than in the United States. Japan appears to be the chief competitor to be met, though British houses will also be factors. If the Chinese potters are able to get the making of insulators on a manufacturing basis, the sale of American pins with native insulators should make a good combination.

Great Britain and Germany have apparently furnished most of the line hardware in the past, with Japan and America supplying a part. At present Japan seems to sell the bulk of the line hardware used in China. The market, however, is small and the tendency is to buy the raw stock and have local native workmen make up what is needed in such simple fittings as shackle insulator yokes.

Brackets with a lag-screw fastening, of the type termed "swan necks," probably make the largest item of hardware outside of bolts, and there is no reason why American manufacturers can not get this business if they go after it, though Japan will be a close competitor.

BATTERIES.

In the dry-cell line American manufacturers are in an excellent position and there is a good market, the majority of the telephone systems being of the magneto type. The climatic conditions are such that cells do not dry out as in some countries and the normal life is longer. Competition in the dry-cell field is keener than wet cells. Danish, British, American, and German manufacturers were in the field prior to the war. The Danish Hellesen cell is regarded as the best cell in the market, and the officials of one of the largest telephone systems in China (foreign owned and operated), stated that they had cases frequently where the Hellesen cell would last as long as five years in a subscriber's set, with only a single cell installed, 2.5 inches in diameter by 6 inches high. A good grade of American cells has been used to some extent, but the company claimed that it did not get more than a year's life out of the same size American cell used under the same conditions as the Danish. The cost of this American cell was about 6 tael cents c. i. f. Shanghai, duty paid, in pre-war times, while the Hellesen cell cost 60 tael cents. Of late the Hellesen cell is made up with copped-iron terminals, which give trouble through corrosion.

British or German cells did not appear to be in stock at dealers visited, the cells carried being American and Japanese. The latter generally seen are low in price and very inferior to other cells; they deteriorate rapidly when kept in stock. One large buyer said Japanese cells would last eight months in stock, while American makes would hold up for two years. As a comparison of price one large importer had bought some 2 by 2 by 5 inch square cells and some 2.25 by 5.5 inch round cells made by Shomura & Co., of Kobe, Japan, for $5.70 Mex. per dozen c. i. f. Hongkong, while a well-known No. 6 American cell had cost $9 Mex. per dozen c. i. f. There are some fairly good Japanese cells, but these are a trifle higher priced than the good-grade American cells and were not seen in the market to any extent.

There is little use for storage batteries in China at present.

PACKING AMERICAN GOODS FOR CHINA.

Only a few complaints were made of the way in which American electrical goods are packed. In most cases importers had little trouble with electrical goods, and when they did the goods in some instances were well cased but injudiciously arranged internally.

One instance noted was that of a marble power panel for a telephone-exchange installation. This had been shipped out in the following manner: The panel (which had two large-diameter holes at the top for flush-type instrument mounting), was laid in a case of about its length but slightly wider, and was held at top and bottom by wooden cleats on the back and front sides. Excelsior was well rammed all about the panel and the tendency for the panel to slip sideways in the cleats was taken care of. The case, which was of inch lumber, was then well nailed, after which the whole case was itself packed in excelsior, well rammed apparently, in another case. The second case was well made and nailed, and also strapped, as the writer recalls. The case was received apparently in good order, no external damage being incurred; but when the inner case was opened it was discovered that the panel was badly cracked across at the section where the instrument mounting came. The case had evidently been dropped sharply when lowered into the ship's hold or when discharging to the dock, or it may even have been roughly pushed over from end to side during its railway journey. The panel was more or less rig-

idly held by the cleats at the ends, while the excelsior under the middle portion would give. Like a beam supported at each end, the panel had little strength to withstand the shock of being dropped or tipped over, especially with the weakened cross section, where the instruments were to go. This was a case of injudicious rather than careless packing.

Another instance of injudicious packing was putting battery jars and storage-battery plates in the same case, with a supposedly solid partition between the two. Rough handling had loosened the partition and some of the jars were broken. Separate packing of the two will remedy further troubles. This complaint was made in a Manchurian city and the cases had been shipped over the Japanese railway and probably on Japanese steamers.

Little American line hardware was seen in China, but a complaint was registered against the packing of one company making such goods. This was in regard to a shipment of steel insulator pins, which left the factory in light kegs and arrived in China minus some of the kegs, with many pins delivered loose. The proper method of packing such goods for shipment abroad is to place them in sound wooden boxes of three-fourths-inch or 1-inch lumber, strapped, holding 100 to 300, depending upon the size of the pins or other similar fittings. In that manner the shipments would arrive in good shape and would be easily arranged in stock. The boxes could also be lined with tar paper to good advantage.

For many classes of electrical goods, measurement is the basis of tonnage in determining the freight on a case, so that a little additional weight makes no difference. The matter of freight should therefore not deter manufacturers from using heavy lumber in their cases, well braced and nailed, and then strapped with a weight of metal that is in accordance with the case dimensions and the lumber used. Cases may well be tar-paper lined and possibly tin lined in some instances. The best plan to follow is to keep in touch with the importer and try to meet all reasonable suggestions that he has to offer. The destination of goods after reaching a main port is a factor in determining the size of cases, as interior-transportation limitations must be anticipated.

The following table shows the imports of different kinds of electrical goods into China from specified countries in 1913, 1914, 1915 and 1916:

Articles and countries—	1913 *Haikwan taels.*	1914 *Haikwan taels.*	1915 *Haikwan taels*	1916 *Haikwan taels.*
Telegraph and telephone materials—				
Hongkong	40,747	96,597	78,862	12,966
United Kingdom	260,518	59,180	171,169	87,514
Germany	224,864	227,765	.....	.....
Sweden	.....	.....	14,852	35,071
Belgium	89,669	55,576	.....	.....
Russia and Siberia—				
By land frontiers	1,600	31,917	7,219	4,256
Pacific ports	3,150	2,186	1,954	1,125
Japan	88,668	78,271	64,673	378,592
United States	18,815	12,598	22,644	66,036
Other countries	23,943	39,233	74,266	43,204
Total—				
Gross	751,974	603,323	435,639	628,701
Re-exports	32,523	32,730	25,436	17,558
Net	719,451	570,593	410,203	611,143
Grand total—				
Gross	3,817,393	4,444,743	3,260,941	4,803,561
Re-exports	133,394	84,047	131,323	184,344
Net	3,683,999	4,360,696	3,129,618	4,619,217

The classification of electrical goods in the Chinese import statistics is so general that the American official figures are presented in the following table, showing exports of electrical goods from the United States to China and Hongkong for the fiscal years 1913, 1914, 1915, 1916, 1917, and 1918:

Articles and countries—	*Years ending June 30—* 1913	1914	1915	1916	1917	1918
Batteries—						
China	.....	$ 5,029	$ 4,092	$14,065	$ 20,330	$31,125
French leased territory	.....	.....	.....	.....	.....	75
Hongkong	.....	429	286	555	439	3,219
Insulated wire and cables—						
China	.....	16,485	35,428	20,215	115,525	97,494
Japanese leased territory	.....	1,357	.....	.....	143	.....
Hongkong	.....	1,784	8,990	.....	1,010	2,488
Telegraph instruments (including wireless apparatus)—						
China	.....	156	650	.....	14,567	.....
Japanese leased territory	.....	.....	620	.....	.....	.....
Telephones—						
China	4,092	11,795	11,993	15,685	116,745	91,355
Hongkong	5,723	.....	3,000	.....	42	379

The present total trade of China in electrical goods is not impressive, but however small it may be now, the manufacturers of the United Kingdom, Germany, and Japan have appreciated the possibilities of the field and have been awake to the fact that preparations must be made in advance to take advantage of the market as it grows. With Germany temporarily eliminated from the field, the United Kingdom and Japan are competing for the commercial connections of that country before it is again able to offer goods in the market. The electrical manufacturers of the United States are beginning to realize the opportunities in China, but still they do not show the aggressiveness of other countries.

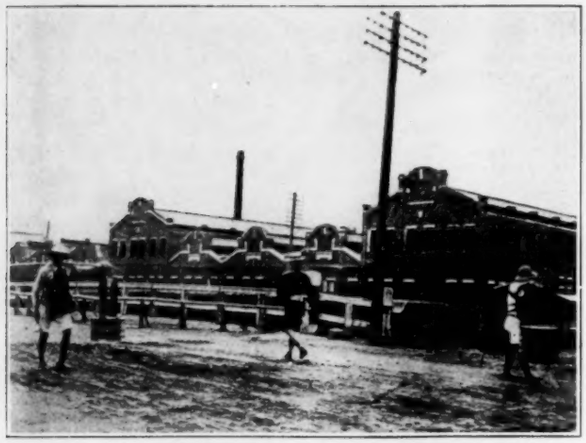
All Chinese customs duties are nominally 5 per cent ad valorem.

* * *

The Market in Japan

THE telephone facilities throughout Japan are owned by the government and are not developed to the same extent as other electric utilities. A report gives statistics up to September, 1916, at which time there were 1,145 "centrals" and 222,512 subscribers. A newspaper in Tokyo, in giving these figures in the fall of 1917, states: "However, this is not good, considering that more than 153,000 subscribers are waiting for the installation of apparatus, some of them having waited for more than 10 years." It was said that applications for service were on file that had been made in 1907. The difficulty in getting service is such that when a subscriber wishes to dispense with his phone, he does not notify the local management that he desires it disconnected. He offers his number to a broker who probably has a long list of "buyers" and the "buyer" is soon found. The "purchaser" and the "owner" sign a "registration of transfer," their signatures being authenticated at the mayor's office; the "purchaser" then pays the "owner" through the broker anywhere from 500 to 5,500 yen ($250 to $750), and a few yen to the government, for the cost of the transfer, according to a fixed schedule depending upon the distance of the installation from existing available lines. After that all the subscriber has to do is to pay his telephone charges at regular periods.

To show that the prices quoted for "buying" a telephone are not exaggerated, the writer can cite the experience of an American business man in Japan. The Kobe branch needed a telephone and could hardly wait for one in the regular course of events. The Kobe manager inquired of brokers and was quoted at a price of 1,200 yen ($600) on August 7, 1917; he at once advised the head office, where the price seemed pretty high, but instructions were finally given to take



Yokohama Electric Wire Works at Yokohama, Japan.

the telephone at that price if a better proposition could not be obtained. When the branch manager went to the broker on August 10, to arrange for the telephone at the price quoted, he was told that the price had risen to 1,500 yen ($750) since he had first inquired. The head office then said it would take a chance on getting a telephone direct from the government on the application made on August 5 for an "urgency" telephone. The firm was to be advised about September 12 whether or not its application was accepted. If it was, the telephone would be installed about the end of March, 1918. They would pay 100 yen ($50) to the government when the application was accepted, and in addition 40 to 50 yen ($20 to $25) for the instrument and its installation. When service was given the rate would be 54 yen ($27) per year, payable quarterly.

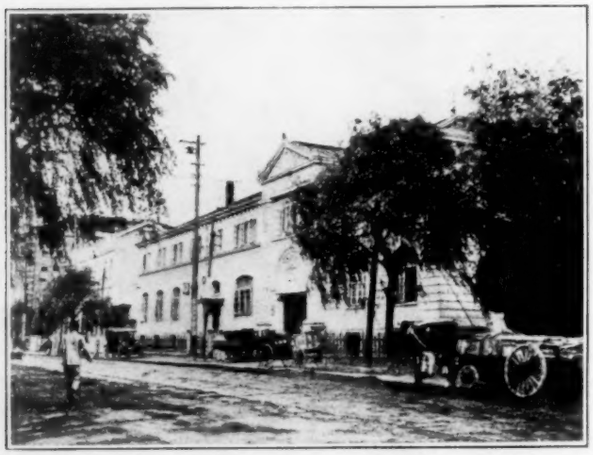
A few clippings from the *Japan Advertiser,* published in Tokyo, will throw some light on the telephone situation in Japan. The first one is from the issue of August 14, 1917; this was headed "Method of Obtaining Telephones Announced":

The Yokohama post office has announced that from September 3 to September 12, exclusive of Sundays, applications for the urgent installation of telephones will be received for the current fiscal year.

The number of telephones that will be installed in Yokohama this year in this special way will be 300, and those who want their telephones at an early date or by the end of the current fiscal year on March 31, must send in a special application to the Yokohama post office during the days mentioned.

This is in addition to the ordinary application for a telephone. For the application for the urgent installation, one must pay 185 yen ($92.50) in addition to 15 yen, which has already been paid with the ordinary application. In case the applications for the urgent installation exceed 300, the officials will make the choice.

This peculiar system is adopted because the government, owing to the shortage of funds, cannot fill all applications, which greatly outnumber the number of installations possible annually.



Plant of the Oki Electric Company at Tokyo, Japan.

The special-application proposition attracted a large number of people, including many who represented brokers and merely took a chance on getting a telephone for resale. People stood in line for hours. The *Japan Advertiser* on October 21, 1917, carried the following item in its issue of that day, under the head "Urgency Telephone in March":

In regard to the inquiries of the urgency telephones for which applications were made recently, the Yokohama telephone office announced yesterday that the applications are now under investigation by the authorities and the result will be completed by the middle of next month. As soon as the investigation is completed the announcement will be made and 300 new urgency telephones will be installed at the beginning of March.

The last item seen concerning the matter was in the *Japan Advertiser* issue for December 2, 1917, and appeared under the caption, "Yokohama's Telephone Gamble":

The Yokohama post office, which has been investigating 4,000 applications for urgency telephones, has completed the work and will announce the result Monday, December 10. Of the 4,000 applicants 300 persons will get telephones, which will be installed by the end of March.

Public opinion will probably force the improvement of the telephone situation, as the increased business activity due to the recent industrial boom has made necessary a higher efficiency in this class of public utility.

The Japanese government operates the telegraph system also, which appears to give better service than the telephone. Rates are fairly low. The wireless development is likewise conducted by the government; and there are 11 land stations and 88 ship stations. The government has several wireless stations on Chinese territory, one at Hankow having sufficient sending radius to talk with Tokyo.

In considering the possibilities for the sale of electrical goods in Japan the fact must be recognized that that country itself is becoming a manufacturing nation and that the Japanese people will buy home goods wherever possible in preference to foreign products. This attitude is exceptionally marked in Japan and is a very important factor in trade with that country.

Another factor, which is involved especially in the sale of apparatus, is the close relation existing between large industries and the more important electrical manufacturers of the country. In many cases these are financially interlocked, and it is natural that the industries will buy from themselves anything that can possibly be made in Japan. In fact, it would seem that some pieces of apparatus have been manufactured locally under these conditions, where it would have been far more economical to buy from abroad.

IMPORTS OF ELECTRICAL GOODS

The following table shows the imports into Japan of telephone goods in 1912, 1913, 1914, 1915, and 1916, and the amounts received from the principal countries of origin:

Articles and countries—	1912	1913	1914	1915	1916
Sumbarine telegraphic or telephonic cables—					
United Kingdom	101,630	25,701	463,244	154,637	644,329
Germany	1,597	.....	.....	.....	.....
Total	103,227	25,701	463,244	154,637	644,329
Telegraphic or telephonic instruments, and parts thereof—					
United Kingdom	10,625	5,401	20,231	14,318	14,279
Germany	6,687	5,014	2,088	.....	1,000
Belgium	11,918	6,836	2,924	.....	.....
Denmark	29	191	144	2,813	1,238
United States	46,110	19,035	10,193	7,163	13,299
Other countries	528	326	4	291	114
Total	75,897	36,803	35,584	24,585	29,930

The following table shows the exports from the United States to Japan in the fiscal years 1913, 1914, 1915, 1916, 1917, and 1918:

	Years ended June 30					
Articles.	1913	1914	1915	1916	1917	1918
Batteries	.....	$ 5,906	$5,744	$ 4,232	$ 7,816	$ 15,585
Telegraphic instruments including wireless	$ 5,178	8,106	160	14	26,331	40,629
Telephones	30,407	13,671	5,901	73,767	148,383	186,793

As far as the United States is concerned, the trade in telephone material and equipment is complicated by the fact that an American company making that kind of goods is financially interested in a Japanese telephone-manufacturing plant, and sends out certain parts to this plant. The American company also has branch plants in England and on the Continent, one of the most important of which has been closed as a result of the war. This plant in the past made up goods for export and it is likely that a part of this trade has been diverted through the American and Japanese plants, accounting in part for the large growth in telephone exports to Japan shown in the table on page 136. The trade returns of Japan do not correspond very well with the American statistics, probably because of the difference in the periods covered by fiscal years and of variations in the method of classification.

Outside of the trade resultant upon the financial connection between the American company and its Japanese plant, it is not likely that there will be any opportunity for manufacturers of this class of materials in the United States to do much business in Japan. Besides the American-Japanese company referred to, which is the largest in the country, three or four Japanese factories are engaged in this class of work, and the government, which controls the telephone systems, will not be likely to buy telephone equipment or supplies from abroad when somewhat similar goods are obtainable in Japan. Where part of the equipment must come from abroad and part can be obtained direct from a local manufacturer, the American-Japanese factory will naturally be in a better position to bid than will any outsider.

One of the illustrations shows a Japanese-made telephone as installed in the rooms of a prominent hotel in a large Japanese city.

Telegraph and radio equipment also is made in Japan, and foreign manufacturers will not be able to sell any such goods except in the case of highly special parts. The export statistics of the United States show a large increase in 1917 and 1918 in goods classified as "telegraph instruments (including wireless apparatus)," which may be accounted for in part by the shipment of such goods to Japan for use on vessels under construction for foreign countries.

Wires and cables for telephone and telegraph work are all made locally, except submarine cable, which is still imported to some extent, though a Japanese manufacturer is making such cable also. There is no opportunity for foreign manufacturers except in the submarine-cable line, and in this line American manufacturers have not been able in normal times to compete with British manufacturers. German cable makers were getting a good deal of this business just before the war.

No wire, either bare or weatherproof, will be imported, and the same can be said for such cable as is used for power work. Insulators have been made in Japan for some years, and while foreign manufacturers have in the past supplied those used for high-tension work, of late years Japanese-made designs have taken most of the business open, both pin and suspension type insulators being manufactured. Insulator pins are made locally for the home requirements and for export. The same conditions exist in other pole-hardware lines.

Wooden poles and cross arms are of native timber, and there is an ample home supply. In addition, poles are exported to China. Steel structures have been bought abroad for most of the work in Japan, but the country is making efforts to obtain its own supply of iron ore and its own mills, and thus be in a position to become

There is no opportunity to sell wet cells or dry batteries in Japan, as these are made locally and American products in this class can not be delivered

Operating Room of the Minami Osaka.
—Photo Supplied by Kozo Ishikawa, Tokyo.

at a competitive price. Many cheap dry cells and one fair make are being turned out in the country. While American cells can compete with Japanese batteries in China, for instance, on a price-quality basis, they can not pay freight and duty and do so in Japan.

CUSTOMS TARIFF

The tariff in Japan is drawn so as to protect the industries of that country, and many raw materials or partly manufactured materials not produced in the country are entered free of duty. The same applies to goods not as yet successfully manufactured in Japan, while, on the other hand, there is an ample duty on such things as are being made in the country. As typical of the tariff, submarine telegraph or telephone cables, which have not yet been manufactured in Japan to any extent, are admitted free of duty, while ordinary rubber-covered wire pays a duty of 5.46 per pound.

The following figures show the rates of duty in Japan on electrical goods of different kinds. Duty is levied on net weight except as otherwise specified.

Ammeters and voltmeters	$23.53 per 100 pounds.
Batteries:	
Storage batteries	20 per cent ad valorem.
Dry batteries	$5.20 per 100 pounds.
Other	25 per cent ad valorem.
Batteries, parts of (except carbons for electrical use):	

Electrodes	20 per cent ad valorem.
Other	25 per cent ad valorem.
Posts and other material for suspending electric lines, not otherwise provided for:	
Posts and parts thereof	$0.70 per 100 pounds.
Telegraph and telephone instruments, and parts thereof, not otherwise provided for	20 per cent ad valorem.
Wire, insulated electrics:	
Armored with metals:	
Submarine telegraph or telephone cables	Free.
Other—	
Combined with india rubber or gutta-percha	$4.14 per 100 pounds.
Other	$2.07 per 100 pounds.
Other—	
Flexible cords:	
Combined with silk	25 per cent ad valorem.
Other	$6.78 per 100 pounds.
Other:	
Combined with india rubber or gutta-percha	$5.46 per 100 pounds.
Other	25 per cent ad valorem.

JAPANESE FACTORIES

There are several makes of wet cells and probably at least a half-dozen manufacturers of dry cells in Japan. In the latter line there is a considerable output, especially in the types used for flashlight work. Most of the factories are small or are a small part of larger works. The Oki Electric Company, for instance, makes batteries in a room of its plant, the work apparently being all done by hand. The best product is that of the Yai Dry Battery Company, whose prices, however, are higher in competition abroad than those of standard American cells.

There are four important factories engaged in making telephone and telegraph equipment, two of the plants being quite small. The two larger are the Nippon Electric Company and the Oki Electric Company, both located in Tokyo.

The Nippon Electric Company is controlled by an American telephone manufacturer and is said to make a broad line of instruments, including everything but intercommunicating sets. Lead-covered dry-core telephone cable is also manufactured, and, as a side line, certain accessories, such as American-type snap switches. The Nippon Electric Company was established in 1899 and has a fairly well-equipped plant. About 800 hands are employed.

The Oki Electric Company has a plant of approximately the same size as the Nippon Electric Company in the number of men employed, though its plant is more crowded. After a trip through this plant one gets the impression that it is a number of small shops rather than one factory. While this works employs about the same number of men as the Nippon Electric Company, its line is much broader and it is not so important in the telephone field. Wireless sets, fire-alarm equipment, dry cells, motors, railway-signalling apparatus, etc., are manufactured, in addition to telephones. The telephone line made includes both American and European type instruments and the general products are shown in a bulletin accompanying this report.

In passing through the Oki plant it was noticed that many of the machine tools were Japanese made, with a few American here and there. In another electrical manufacturing plant, all Japanese-owned, the engineer escorting the writer through remarked that it was difficult for them to expand as they wished to because of the lack of new lathes. The writer suggested that lathes and other tools are made in Japan, whereupon the engineer said that Japanese lathes had been tried but were not satisfactory. In the Oki plant, however, a large number of Japanese tools were in service.

It was noticed in the woodworking or cabinet-making section of the Oki plant that the working conditions were primitive, and in the machine shop the men were crowded. As in many other Japanese plants, benches were not provided for handling operations on small pieces, the work being done on the floor. The main building of the Oki Electric Company is shown in one of the illustrations.

The other two telephone manufacturers of any importance, the Kyoritsu Electric Manufacturing Company and the Yoshimura plant, were not visited; their works were said to be small.

Wages in telephone manufacturing follow the general scale fairly well, being now considerably above what they have been in the past. Girls making induction coils and paid at piece rates averaged about 50 sen ($0.25) per day, working net nine hours, the day beginning at 7 a. m. and ending at 5 p. m., with 15 minutes rest in the morning, 30 minutes for lunch, and 15 minutes rest in the afternoon. For a whole telephone works, when running on average production, the wages per month received by the employes average about 20 yen ($10). When the plant is very busy and a large number of unskilled hands are added, the average drops, and when the work slacks off and trained help only are retained, the average increases.

The manufacture of wire for all electrical uses is one of the most strongly developed industries in the electrical field in Japan. There are three very large companies and probably a half-dozen smaller ones.

The Yokohama Electric Wire Works is the largest manufacturer in Japan, operating three plants and employing a total of 1,200 men. This company is 80 per cent controlled by the Furukawas, who own the Ashio copper mine, one of the best producers in all Japan, and who operate a large refinery and wire-drawing plant at Nikko, so that their copper supply is obtained at a low figure. The Furukawa company does commercial smelting and refining, in addition to handling its own ore, and is a large exporter of refined copper.

The Yokohama Electric Wire Works, like most Japanese plants, will make practically any kind of wire desired, turning out large amounts of British standard rubber-covered wire for export, in addition to the paper-taped trade grade made for local consumption. The main rubber-covered-wire plant at Yokohama is equipped mainly with British machinery, whereas the cable plant near by is equipped with German machinery. The men employes receive 1.50 yen ($0.75) per day down to 0.60 yen ($0.30), and girls are paid as low as 25 sen ($0.125) a day. The rubber-covered-wire plant of this company in Yokohama is shown in figure 19.

Probably the next most important wire plant in Japan is that of the Sumitomo people, located at Osaka. This plant is not so large as the Yokohama factory, but it is operated in much the same way, in that the owners have their own copper mines and are people of large resources. The Fujikura Electric Wire Manufacturing Company at Tokyo is the third of the manufacturers of this class of materials, its plant being of about the same size as that of the Sumitomo Company.

The half-dozen smaller manufacturers make probably one class of wire each and employ about 20 men

or so. Only the three large companies engage in export work.

British buyers in Japan stated that they hardly believed Japanese makers could produce good rubber-covered wire in normal times at lower prices than the better manufacturers in England, whose prices have generally been lower than American. The writer is inclined to doubt this after visiting the plant of the Yokohama Electric Wire Works and the refinery and wire-drawing plant at Nikko. The Japanese manufacturers are making large profits, one company paying 16 per cent dividends in 1915 and 30 per cent in 1916. In addition, the prices for the billets and bare wire used in the covered-wire plants are probably high enough to enable the owners to show good earnings on their refineries and wire-drawing plants. The Japanese plants therefore have a good margin on which to work, and though the cheap labor is not so much of a factor in wire as in other electrical lines, the combination of cheap labor and cheap material should enable the manufacturers to turn out wire at a low cost, even allowing for lower efficiency.

In the production of electrical goods, however, the Japanese do not seem to exercise the care that is necessary to insure continuous high quality, and this fact may work against them. Buyers who are at present coming to Japan to place orders must arrange for close inspection of goods before accepting and paying for them. In the case of some No. 18 Cablemakers' Association wire for Australia, the braid of part of a shipment was red and part was black as usual. Both kinds tested well and seemed to be all right when accepted, but upon arrival in Australia it was found that while the black-colored wire was good, the red wire showed a very low megohm test. Investigation showed that something used in coloring the outer braid had caused the rubber compound to deteriorate.

In enameled wire very careful inspection is given as to both gauge and insulation, and about 10 per cent of shipments were generally rejected by one buyer. This was the product of one of the three large companies. This buyer stated that on silk-covered and cotton-covered wire, the Japanese companies seemed to turn out good work.

* * *

Conditions in Chosen

The telegraph and telephone systems of Chosen are both government owned, and the operating conditions and tendencies are similar to those noted in the report on Japan. Figures for 1916-17 stated that there were then in operation 1,189 miles of telephone and 1,994 miles of telegraph line. The available data give the total combined gross earnings for the postal, telegraph, and telephone systems as $1,954,556, which does not indicate any remarkable development in telephone and telegraph work.

It is expected that all the purchases of telegraph and telephone equipment and materials will be made in Japan as the practice is similar and there appears to be no likelihood that an automatic system will be taken up.

* * *

The Siberian Market

While there is no electrical manufacturing in Siberia, there are large works in Russia which have the advantage of the duty on electrical goods over their competitors outside the country. Siemens, at Petrograd, is allied with the German company of that name and has been making telephone and telegraph equipment and selling German accessories.

Russian electrical manufacturers have to import considerable of their raw material, but the protection of the tariff in the past has to some extent enabled them to meet competition from the outside in Russia proper, though in eastern Siberia, the territory covered by these notes, the long overland haul from Russia is said to be so expensive that it is believed American manufacturers can well compete in normal times.

Imports of telephone and telegraph apparatus into Russian Pacific ports in 1914 were 1,800 lb., valued at 3,279 rubles.

There is a large field for telephone equipment in Eastern Siberia. At present the development is slight and many towns of fair size have no telephone systems. In addition to manufacturers in Russia, normally in the field, an American company has close connections in the country, and it is doubtful whether other American telephone manufacturers will be warranted in entering the field at the present time, at least. American telephone equipment generally will be able to compete in the market.

Telephone-line construction employs cross arms for leads of any capacity. Steel pins and porcelain insulators are used. Aerial cable is employed in a somewhat limited way. There is an opportunity for the sale of American line hardware, such as bolts, pins, and brackets, but not of insulators. Prior to the war these came from Germany to a great extent; now Japan has the insulator market and prices are lower than it is believed the United States can make with similar goods.

In telephone cable Japan is now selling what is required for such construction work as is done. Engineers believe American manufacturers can meet Japanese competition on cable, but the writer is doubtful on that point. There is a possibility of a good volume of business being open at the close of the war for the extensions necessary to accommodate the rapidly growing eastern Siberian cities.

There is only a small market for electric batteries in this territory. German dry cells have had a wide sale in the past, but American and Japanese makes are now in the market. American manufacturers can compete with the Japanese without difficulty in both price and quality.

Costs $1.09 to Collect $0.03

The state of Minnesota set out to collect 3 cents in gross earnings taxes for 1918 against the Union Telephone Company of Hester.

A member of State Auditor J. A. O. Preus' staff made a duplicate draft for the amount and after recording it sent it to State Treasurer Henry Rines. The record was extended on the treasury books and the draft forwarded in an envelope bearing a 3 cent postage stamp. Perhaps it will be necessary to use another 3 cent stamp to jog the memory of the company's secretary that he must spend 3 cents more to forward the remittance. Then it will take another 3 cent stamp to mail a receipt.

So the 3 cent collection may cost the state 9 cents and more than $1 in accounting cost, but the state law levying a 3 per cent gross earnings tax in lieu of other taxes on telephone companies requires it and the state officials have no alternative.

The Babel Multiplex

P. E. Erickson, who with E. D. Johnson has been installing some equipment in Brazil, tells of their adventures in the *Western Electric News*. He brought back an almost incredible story of a multiplex telephone system that antedates the one described last February. There was one line which was in use at night, and the extent to which it was used makes an interesting addition to Mr. Jewett's article. The line in question was leased for night service to a couple of newspapers, one in Rio and the other in Sao Paulo. They had been using it for some time when C. M. Mauseau, the manager of the teelphone company at Rio, dropped in on his newspaper friend one day to see how things were going.

"Great!" was the reply. "We surely are getting our money's worth out of that line, because you know we carry on three conversations at once over it." Mr. Mauseau didn't know, and expressed a little surprise at the news, whereupon the newspaper man explained how it was done. "It is this way," he replied. "You know that we have three telephone instruments at each end of our line. Well, we station a man at each telephone, one whho speaks Portuguese, another who speaks French, and a third who speaks English. They do the same thing over in Sao Paulo, and then they all start talking. It may sound like a small edition of the Tower of Babel, but it really is quite easy to get along. You have conducted a conversation at an afternoon tea, haven't you, with people chatting all about you? Well, this is the same principle, and in our case it is all the easier to concentrate on one conversation and ignore the other two because they are in different languages. Yes, we certainly are getting our money's worth out of our line."

Mr. Mauseau agreed with the final statement and passed the story along. Those who are mathematically inclined may devote a few hours to the task of figuring out how many conversations could be carried on over one line if the Brazilian tri-lingual system were combined with the newly devised multiplex telephone.

The Aborigine Code

Because of the nature of the country over which American troops fought in the Meuse-Argonne offensive, the Germans found it easy at times to cut in on our field telephone wires.

The commander of one brigade of artillery attached to an American division was particularly annoyed by enemy wire-tappers in a heavily wooded section of the Argonne. Code messages from artillery observers were being intercepted by Boche listeners-in, and the commander knew, as all armies know, that no code is impregnable when experts get working on it.

The artillery commander took up with the colonel of one of the line regiments the question of the Huns' wire tapping activities. And the colonel hit upon an idea.

Two Indians, both of proud Sioux lineage, members of one of his companies, were assigned as telephone operators. One was to go forward with the artillery observer, the other to remain at the brigade receiving end of the wire which the artillery commander was certain the Germans had that day tapped somewhere along the line.

The two Sioux, both intelligent, willing men, were sent for and given instructions. Those instructions were to transmit in the language of their fathers, all messages given them at their respective posts.

Now, when two Sioux Indians get talking together in their own tongue, what they say sounds very much like code, but isn't. Anyway, it raised hob with the code experts of certain Prussian guard units.

The Sioux stuck on their jobs for three days and nights. They and the artillery commander and their own colonel enjoyed the situation immensely. If the Germans got any fun out of it they kept it to themselves.—*The Stars and Stripes.*

Army Telegraph Work in France

According to a recent account, the army has handled the extensive telegraph work incumbent on it in an efficient manner. On November 15, 1917, American telegraphic communication was opened between Bordeaux and Paris with a few telegrams. By November 15, 1918, the small office had expanded into an establishment requiring a personnel of fifty men and a plant with thirty-two desk telegraph outfits from which radiate circuits to twenty-five outside cities and camps. On one day, October 8, this central office handled as many as 4,620 telegrams. One of the quickest wire-laying jobs on record goes to the credit of men stationed at a rest camp near by. At the time when the telephone exchange was moved from its former location to the new headquarters it was necessary to install 100 circuits between the new building and the French Exchange, a distance of nearly a mile, through the busiest part of the business district. The presence of signal and power wires in the air at various points made the installation of an overhead cable impracticable. A full infantry company of 220 men was selected for duty. They went to work at 7 p. m. with picks and shovels, and with the aid of twelve acetylene searchlights they worked all night. At 7 a. m. they were relieved by another infantry company increased by the original personnel of the Signal Corps of fifty men and twenty colored stevedores. The work continued in this way from 7 p. m. Friday night until 2 a. m. Monday, when the whole cable was completed.

Massachusetts Court Refuses Plea

The full bench of the Massachusetts Supreme Court dismissed a petition of the Massachusetts Public Service Commission against the New England Telephone and Telegraph Company, by which the commission sought to compel the company to cancel toll rates ordered by Postmaster General Burleson and to return to the schedule in effect prior to January 21st. The court held that the United States was a party involved and could not be sued. The opinion said that it was "a fundamental principle of law that the United States, like all sovereigns, cannot be impleaded unless it consents to be sued."

Those Central Union Mergers

Editor TELEPHONE ENGINEER—We notice in a recent issue of your paper a statement that the Central Union Telephone Company was purchasing the properties of the Kinloch-Bloomington Telephone Company at Bloomington and Normal, Ill.

This is an error, as the Kinloch-Bloomington is buying the Central Union. Likewise the Wabash Valley at Paris is buying the Central Union and the Citizens Independent at Terre Haute is buying the Central Union.

These statements have caused us some embarrassment and we trust you will get this matter straight, so that if you have any further comments to make you will know what the true situation is.

CITIZENS INDEPENDENT TEL. CO.,
WABASH VALLEY TEL. CO.,
KINLOCH-BLOOMINGTON TEL. CO.,
By Hart F. Farwell, President and General Manager.

Summary of the Annual Bell Report

Features of the Record of an Unusual Year

THE fundamental soundness of the Bell System, the competent way it has met the requirements of the war, its manner of dealing with the problems of governmental control, and its understanding of the responsibilities of the future, are set forth by Theodore N. Vail in the report of the American Telephone and Telegraph Company.

The year 1918 has been from every standpoint the most strenuous and difficult year in the whole history of the telephone, says Mr. Vail. It has been impossible to maintain standards and difficult to meet the increasing demands for service, greatly augmented at all centers where war industries and activities concentrated. About 14,000 employes of the telephone system entered military service. Over 20 per cent of the expert staff were taken over by the Government for special or active war service.

Of particular interest is a letter to Mr. Vail from the secretary of war, appreciative of the "splendid spirit of co-operation" of the Bell Engineers, which was indispensable in the development of the airplane wireless telephone set and other important apparatus used in the war.

FACTS ABOUT THE BELL SYSTEM

At the end of the year there were 10,992,325 telephones connected with the Bell System, which owned 7,200,000 and connected with about 3,800,000 owned by connecting companies and rural associations.

The wire mileage owned by the Bell Companies was 23,281,150 miles, 94 per cent copper, and 60 per cent underground. The net amount added to plant and real estate was $77,922,631. The total provision for depreciation of plant during the year was $54,000,000.

The capital obligations of the Bell System *outstanding in the hands of the public at the close of the year were* $991,074,264, of which the outstanding obligations of the American Telephone and Telegraph Company represent $676,283,362 and those of the associated companies, $314,790,902. The telephone plants stand on the books of the companies at $1,142,815,341, and appraisals by public authorities indicate a greater actual value. The surplus and reserve aggregate $340,000,000, an increase of over $36,000,000.

In six years the expenditures from Employees' Benefit Funds have amounted to $10,534,594.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

The net earnings of the American Telephone and Telegraph Company for the year were $54,293,016. The interest charges were $10,391,694, and the dividends at the regular rate of 8 per cent per annum were $35,229,698. Of the resulting balance $5,000,000 were appropriated for contingencies and $3,671,622 added to surplus.

The number of stockholders increased over 25,000 during 1918, and now exceeds 112,000, the majority being women. The average holding is 39 shares.

Mr. Vail shows the wisdom of the company's conservation policy. Full maintenance of the property, ample reserves for depreciation and obsolescence, fixed dividend payments, all surplus and unexpended reserves invested in property, issue of capital stock at a premium through convertible bonds, all have contributed to credit and through good credit can financing be done at reasonable rates.

Of the total share capital issued since the American Telephone and Telegraph Company took over the operations, about one-half has realized for the treasury, through exchange for convertible bonds and cash, from 20 per cent to 33 per cent premiums.

A table is given which shows that in the Bell Companies as compared to independent companies and capital obligations are lower per station and the reserve and surplus assets higher.

ENGINEERING ACCOMPLISHMENT

The report makes a remarkable showing of the engineers of the Bell System, which includes the Western Electric Company, Inc. Many went into the Army and Navy, and those remaining were charged with tremendous tasks, both civil and military. Much of their work, performed under the oath of secrecy during the war, has but recently been made known. This interesting part of the report is presented in detail on another page.

GOVERNMENT CONTROL

The terms of the contract with the Government are presented for the information of the stockholders. The provisions include emergency compensation, efficient operation, full provision for maintenance, depreciation and obsolescence, the investment of unexpended balances in the plant, continuance of employees' pensions, disability and death benefits, and of contracts with the associated companies.

These provisions are for the protection of the property, the service and the art. The security holders are assured of the payment of interest and dividends on existing securities and securities hereafter authorized and compensation by the post-master general for such extensions as he may require to meet abnormal conditions.

Mr. Vail explains that government control under authority of the joint resolution of Congress is in no sense permanent, for the property is to be returned after a limited period. He describes the permanent character of the Bell System and explains the gradual growth of its trained organization, its methods and its plant, and how it fitly embodies the development of the art and how it is unique in extent and comprehensiveness.

For these reasons, the first consideration, in the arrangement with the Government, was the preservation and conservation of the property and its organization. Monetary compensation was quite a secondary matter. He also emphasizes the "super-interest" of the public above the interests of either the Government or the Bell System. Both parties to the agreement were working for a common object, the maintenance and continuance of an essential service, hence the terms of the agreement were substantially fixed by existing conditions.

It is shown that the extraordinary rapidity of the increase in wages and in cost of material could not be met by economies in operation. To provide revenue against them a campaign of readjustment of rates had been started during 1917 which was well under way when the properties were taken over, the total increase deemed necessary to meet abnormal increase in ex-

penses being something under 10 per cent. The necessity of continuing this campaign was full set forth to the postmaster general. The business policy of the Bell System was exhaustively discussed and recommendation for compensation as submitted to the President by the postmaster general was substantially in accord with the Bell System proposal.

CHARGES FOR SERVICE

"There is an absolute and immutable relation between the total cost of production and any commodity or service and the total costs of the factors or elements which contribute to production. This sounds so commonplace that it seems useless to state it. It would also seem unnecessary to state that the price at which any service can be continuously sold is governed by the cost at which it can be continuously produced, and yet the public have, without any consistency with their individual practice in their other activities, persistently disregarded these truisms and resisted the application of them to charges for the service of the public utilities of necessity."

Mr. Vail presents a diagram which shows the rise in commodity costs and wages, while telephone rates have remained almost stationary, and relatively to prices of commodities in general they have decreased 30 per cent. About 12 per cent increase in rates is needed, which appears almost negligible when compared with advances in the cost of other commodities.

COMBINATION AND REGULATION

Mr. Vail says that it would be extremely unfortunate if, with a very pronounced public sentiment in favor of it, a wire system with nation-wide, universal, comprehensive service and complete utilization of all the facilities cannot be evolved from the existing conditions.

It seems paradoxical that the interpretation and application of the existing laws against restraint of trade should be an obstacle in the way.

There is little doubt, he says, remaining in the minds of the public, but that regulated monopoly is better than unregulated Government ownership, and there is no longer any extensive conviction that there can be effective competition in the electric transmission of intelligence.

Changes in the existing laws concerning control and regulation, competition and combination are shown to be necessary, and Mr. Vail closes with a few basic principles upon which such changes should be built. The conclusion is that similar utilities, in territories economically determined, should be combined; should have an operating organization shown to be efficient and economical; and with their administration there should be somehow combined by legislation, the power, freed as far as possible from political and class influence, and subject to reasonable review "to equilibrate capital charges, operating costs and revenue."

Oregon Merger Completed

Transfer of the holdings of the Home Telephone Company in Portland, Oregon City, Albany and Corvallis was formally made to the Pacific Telephone & Telegraph Company for a consideration of slightly more than $2,000,000, and the consolidation of the two companies was thus effected.

According to officials of the Pacific Company it will take about one year to consolidate the physical properties of the two companies. Under the consolidation, the Pacific officials declare patrons of the Home Company will be allowed to retain the automatic instruments and secure service over the lines of both the Pacific and the former Home Company.

Patrons now using both telephone services will be allowed to select the service desired and have the other service removed, thus cutting the present telephone bill of many business establishments of Portland in half.

The consolidation of the two companies is the culmination of more than a year's effort on the part of bondholders of the Home Company, represented by Oswald West, receiver of the insolvent Home Company. Seeing that suspension of operations was obvious under existing conditions, Mr. West began negotiations which led to a modification of a previous order issued by the United States department of justice restraining the Pacific Company's officials from negotiating for the purchase of the Home Company.

With the control of the Home Company carefully conserved through the holding of a majority of the stock of the company, Mr. West secured a contract with the officials of the Pacific Company, agreeing to a purchase price in the event that the sale was consummated by March 1, 1919.

The transfer will not interfere in any way with the present operation of the Northwestern Long Distance Telephone Company, which has been protected in the decree of the department of justice, when a modification of the order restraining the Pacific Company from negotiating for the purchase of competing plants was made. Jay Bowerman, attorney for the Northwestern Long Distance Telephone Company outlines the standing of this company. The statement follows:

"The Northwestern Long Distance Telephone Company is not in any way affected by the consolidation of the local exchanges in Portland belonging to the Home Telephone Company and the Bell Telephone Company. On March 26, 1914, a decree was rendered in the United States district court by Judge Bean, under the terms of which the Northwestern Long Distance Telephone Company was authorized to connect with all of the local telephones of the Bell Company in Seattle, Tacoma and Portland.

"Other conditions have enabled the Northwestern to secure connection with all of the Bell telephones at other points. By this decree the Bell Telephone companies were perpetually enjoined from buying up any competitive telephone companies in this territory. Before the Bell Company was able to purchase the local plant of the Portland Home Company it was necessary to secure a modification of this decree.

"The attorney general of the United States refused his consent to any modification until provision was made for the protection of the rights and interests of the Northwestern Company. Ample protection has been provided in this: The consolidated exchanges in Portland will serve the long distance patrons of the Northwestern Company and the Pacific Company in the competitive territory on equal terms. No favoritism will be permitted.

"As soon as the mechanical details can be worked out, all telephone calls will be made under what is known as the 'questioned call' method, that is, the operator will inquire of the patron which service is desired and after the patron has selected the service of his choice, he will be connected with the long distance operator of that system.

"A similar system will eventually be installed for the consolidated plants at Oregon City, Albany and Corvallis."

Some Telephone Gordian Knots

There Are Plenty of Problems for the Technical Man to Solve

THERE is no need of a telephone many worrying because there are no more worlds to discover, says J. J. Harmon, district plant chief, Topeka, Kas., in the *Southwestern Telephone News*. Perhaps you like to invent—or, stating it another way, perhaps you want to do things better than they are being done. All right, there is nothing to prevent you from trying the following suggestions on your mental piano:

What have you to offer as a better means of lashing cables at sleeves and bends, also holding cable on grades?

You have experienced low insulation at times which you have traced to moisture on the porcelain face plate of terminals. What is the chief cause, and what have you to suggest to overcome it?

Here is a real one, and an old-timer at that. We've all probably thought about it. Why does the cable buckle, or "snake," and what can be done to prevent it?

While we always try to avoid running drops through trees, yet sometimes it is unavoidable or very expensive to avoid doing so. An inexpensive protection that could be readily applied would lower our installation costs. Have you one?

Why hasn't a strong mouthpiece been developed instead of the present breakable one?*

We all know how unsatisfactory marlin twine has proved to be as a means of supporting cables. At best it has a relative short life when exposed to the elements. In places where the squirrels inhabit the city they seem to take a particular delight in going from one end of a cable to the other, cutting all the marlin lashings where they are attached to the messenger. Why they do this is a mystery. Some method of tying or lashing the cable that would be as permanent as the remainder of the structure and as easily applied and at moderate cost is needed badly.

The No. 14 tight terminal now in common use is probably the most satisfactory cable terminal we have had to work with. It has, however, one defect. As received from the manufacturer, there is no cause for complaint of low insulation between the terminal lugs. It is thought that the trouble is probably caused by rain being driven through the entrance holes at the back of the terminal which are left open when drop wires are removed from the terminal.

The putty which fills these holes of the new terminal serves the purpose fairly well, but in terminals that have been in service for considerable time it is noticed that this putty becomes very hard, loosens and falls out. This trouble may be due to the above cause or it may be to the condensation, as some have suggested. You can satisfy yourself as to this by noticing whether we have this trouble after each rainstorm, or if it only occurs when humidity is high, though no rain falls.

The matter of preventing the buckling or snaking of aerial cables has probably been given as much thought as any problem that plant men have had to contend with. We all know the evil effects of this buckling and how unsightly it makes an otherwise good job. Some plant men are of the opinion that no remedy can be found. But who knows? You might be able to suggest just the proper thing.

*It has—Editor.

The telephone man's heaven will probably be a place where there are no trees that can in any way interfere with the plant he constructs or has to maintain. It is always well to avoid running drop-wires through trees where this can be economically done and where the drop will have sufficient clearance. We know that in nearly all cases if sufficient time and material are expended that the trees can be avoided. Sometimes after the drop has been placed a quickly growing tree is planted directly under the drop, and in a short time it becomes necessary to trim the tree or rerun the drop. If an inexpensive, easily applied method of protecting drops can be brought out it will simplify the running of drops and save a lot of money now spent running them as we are often forced to do.

Kansas Man Invents Fire Alarm

When there is a fire alarm in Hutchinson, Kan., the fire bell is rung electrically from central telephone office the instant the operator gets notice. The device is the invention of and has been patented by Manager W. S. Clay of the Hutchinson Telephone Company.

Ellery Williams and Jens J. Juul have bought the rights to the alarm in four states, Minnesota, Iowa and the Dakotas, and will put agents in the field to market it in all towns having telephones and organized fire departments. The parts are being assembled from factories. The merits of the device are thus described:

It occurs during that period of time beginning when a fire started and continuing until the fire is out. The fight to reduce this lapse of time has occupied the mind of man for centuries and the ingenuity which he has been able to display has cut short this period of devastation until all that was left to be improved was the act of turning in of an alarm. Many expensive systems have been devised for this need and they work in most cases very satisfactorily, but to the average small town they are prohibitive on account of cost and difficulty of operation. Working on the theory that all towns have fire alarm bells, which are now rung by hand (if the person ringing them is not too exhausted by his effort to get there in a hurry), this company has perfected and patented a machine that will, when properly installed, and connected by a circuit ending with a switch at the central telephone office, ring the bell you now have as long and as loud as you desire. All that is necessary in the event of a fire breaking out is for some one to telephone central, apprising her of the fact and the location of the fire, and she will have the fire bell ringing before the party giving the information has time to replace the receiver to the telephone he is using. That is all there is to the matter; the quick turning in of an alarm. The modern fire department with its swift running trucks and efficient chemical engines will attend to the rest so quickly that no fire needs to get beyond the dangerous point, saving not only property from loss by fire but from water.

Messrs. Williams and Juul for the purpose of manufacing and marketing the device have organized the Electroalarm Company.

Official Orders

Modified Short-Haul Rates; Tax on Toll Messages

THE Postmaster General has issued the following order No. 2797, dated February 17, 1919:

Order No. 2495 issued by me on December 13, 1918, provided certain charges for classes of telephone toll service to be effective January 21, 1919.

Paragraph 1—To meet public demand for particular person, messenger and appointment calls on short-haul toll messages and which in the interest of the public service it is desirable to furnish, the following schedule will become effective February 21, 1919, by all companies furnishing telephone toll service to the public: For distances of twelve miles or less: Station-to-station rate is 10 cents; the completed person-to-person rate is 15 cents; the completed appointment and messenger rate is 20 cents; the report charge is 5 cents.

The initial period for person-to-person messages at an initial rate of 15 cents will be three minutes and the overtime rate will be 5 cents for each additional minute.

In the case of those routes where the companies, prior to January 21, 1919, provided station-to-station or two number service exclusively, this practice shall be continued hereafter, where the distance is twelve miles or less, at the rates prescribed and under the conditions in Order No. 2495.

In the case of those routes where there were in effect, prior to January 21, 1919, station-to-station or two number rates of 5 cents for distances not to exceed six miles, the rate of 5 cents shall be continued.

Paragraph 2—In cases where it has been and is impracticable or impossible to build direct toll lines between communities on account of natural barriers, such as mountains, waterways, and so forth, or in other extraordinary or exceptional cases, the Operating Board is authorized to suspend in part the rates in effect immediately prior to January 21, 1919. Where such suspensions are made, the Operating Board shall make report of each case to me and such suspensions shall continue in effect until otherwise ordered by the Operating Board or the Postmaster General.

Paragraph 3—Nothing in Order No. 2495 or this bulletin shall be construed as affecting arrangements or basis of settlements between connecting companies in effect January 20, 1919.

Order No. 2534

The operating board appointed under Order No. 2479, dated December 13, 1918, consisting of Union N. Bethell, F. A. Stevenson, G. M. Yorke and A. F. Adams, of which Union N. Bethell is chairman, is hereby directed to assume the operation of the telephone and telegraph systems under governmental control.

Order No. 2535

Order No. 2356 appointing David J. Lewis, chairman, Harry B. Thayer, vice-president, American Telephone and Telegraph Company, Charles Y. McVey, president, Ohio State Telephone Company, Paul P. Haynes, Indiana Public Service Commission and Noah W. Simpson, Missouri Public Service Commission, a committee to make the necessary studies and recommendations to the postmaster general with a view to standardizing the rate schedules of telephone service throughout the United States, is hereby amended by the appointment of Professor A. M. Holcombe of Harvard University and the United States Bureau of Efficiency to take the place of Paul P. Haynes of the Indiana Public Service Commission, who is unable to serve.

Burleson Removes Telegraph Chief

Clarence H. Mackay, president of the Postal Telegraph-Cable Company, was removed March 22d by Postmaster General Burleson. The postmaster general issued an order relieving, besides Mr. Mackay, W. W. Cook, general counsel; William S. Deegan, secretary, and the board of trustees or directors and the owners of the Mackay companies operating the Postal systems from all duties appertaining to the control and operation of service under government control.

A. F. Adams, president of the Kansas City Home Telephone Company and a member of the general telegraph and telephone operating board, was appointed by the postmaster general to supersede the Postal officers.

An announcement by the Postoffice Department says that the order removing Messrs. Mackay, Cook and Deegan from the operation of the Postal company's land lines under government control was "made necessary by the fact that since the Postoffice Department refused to grant the company the compensation asked for by them, these officials have refused or failed to follow out the instructions of the department in the management of the properties; and failed to put into operation promptly the wage schedule and the eight-hour day; and in various ways endeavored to embarrass and discredit the government operation of the wires.

"The reason for the refusal of the department to grant the compensation asked for was that the sworn statement submitted to the Interstate Commerce Commission in behalf of the company placed the net income for 1917 at $117,264, while the sworn statements they made to the Wire Control Board as a bbasis for compensation placed the net income for the same year at $4,485,593.34."

The announcement adds that the value of the plant and equipment of the Postal Telegraph-Cable Company, sworn to in the company's return to the Interstate Commerce Commission for 1916, was $6,647,472, but the officials of the company "declined to make any statement of valuation to the Wire Control Board, although repeatedly requested to do so."

U. S. Supreme Court to Decide

Authority of Postmaster General Burleson to increase telephone rates throughout the country is to be determined by the Supreme Court, which March 17 granted the state of Kansas permission to institute original proceedings against the postmaster general, questioning the validity of his order of December 13 last establishing new toll rates.

The court ordered that a return be made in the case at the next term, in October.

Federal and state officials throughout the country will co-operate to gain from the Supreme Court an early determination of the question of whether Postmaster A. S. Burleson acted according to law when he promulgated an order for higher long distance telephone rates.

Bell Engineering in 1918

Emergencies of the War Year Bring Extraordinary Technical Developments

DURING the year 1918 heavy responsibilities rested upon the engineers of the Bell Telephone System. Many went into the army and navy, and those remaining were charged not only with their regular duties pertaining to the development and standardization of new and improved methods and apparatus and the application of existing and new standards to the system, but further duties devolved upon them arising out of this country's participation in the war. These extra duties have been varied in nature and of the utmost importance in connection with the successful conduct of the war. Many of them were confidential, and those performing them were, during the continuation of the war, under an oath of secrecy with reference to their work. This obligation of secrecy has, however, been recently removed, and this work can now be reported upon.

For the successful handling of the American forces in France, it was necessary to construct and operate there an extensive telephone and telegraph system extending from the ocean bases to the various army headquarters at the front, and to include in this communication system all camps, supply bases, repair stations, hospitals and other centers of activity, together with connections with the principal centers of our allies, and with the commercial system of France. We not only largely provided the technically skilled men to execute this work, but our engineers assisted and co-operated with the Signal Corps of the army in designing the system, determining the materials best suited for its construction and in applying to it our latest methods of obtaining the most rapid service and highest grade of transmission.

To secure efficient service over their telephone system in France, the American Expeditionary Force found it necessary to employ women operators, and the requirements were particularly difficult since not only must these women be expert telephone operators, but they must also be able to speak French fluently. At the request of the Signal Corps the Bell engineering department, with the assistance of the operating companies, undertook to secure the necessary operators, and to turn them over properly trained, organized in groups, and equipped to start for France. As a canvass of the telephone forces throughout the country disclosed the fact that a sufficient number of French speaking operators were not available, it was necessary to arrange for interviewing thousands of applicants, and assembling those qualified at certain selected points throughout the country where they were given special and thorough courses of training in telephone operating. This work was started about the first of the year, and within two months the first contingent had sailed. Before the armistice, several hundred of these operators were in service in France, and many more were in training. The reports from the expeditionary force bear witness to the important part which they played in the achievements of the American army.

The coast guard system of the United States in peace times provides for the patrolling of the coasts, its function being principally the assisting of ships in distress, and the enforcing of the revenue laws. Immediately upon the outbreak of the war, however, it was important to be able to use this force for maintaining a lookout throughout the whole length of the Atlantic and gulf coasts so that operations by submarines or other enemy activities might be immediately known and reported to the proper authorities.

The system of communication existing at the beginning of the war, and sufficient to meet peace conditions, was entirely inadequate for the new conditions arising from the war, particularly in view of probable enemy submarine operations. The company was requested by the coast guard authorities to assist them in the determination of what would constitute an adequate and practical system, and in the design and supervision of the installation of such a system. A group of engineers was assigned to this work, and a complete system was designed, new apparatus and new methods being developed in many cases, and their installation directed and supervised. This system provided means by which any coast guard station could be put in immediate telephonic communication not only with adjacent stations, but also—through the general lines of communication of the country—with any other coast guard station, and with central points, including all the naval district headquarters, and the general headquarters of the navy at Washington. Included in this communication system were strategically located lighthouses. This required in many cases the laying of special submarine cables, some of these lighthouses being as much as twenty miles off shore.

The work referred to in the last annual report with reference to the installation of telephone systems and trunk line facilities at army cantonments and camps, department and district headquarters of the army and navy, army posts, navy yards, aviation fields, supply, quartermasters' and training camps, munition and other manufacturing plants, ship-building yards and other centers of war activities, has been continued on a large scale, and many engineering problems have required solution in connection with this work. Up to the very end of hostilities the work of extending the toll line plant throughout the United States, the extension of the local telephone plants at the various centers of war activity, and especially at Washington, was very active.

Upon the declaration of war, the personnel and facilities of the engineering department of the Bell System were called into action by the war and the navy departments for the solution of many special technical problems. Some of these were problems not related directly to telephone or telegraph communication, but were of such a nature that the skill and experience of the staff peculiarly fitted it for undertaking their solution.

Prior to the war demonstrations of the successful operation of the radio telephone system had been made and been reported upon. Immediately at the outbreak of the war the company was called upon by the Signal Corps of the army to advise them as to what could be done in successfully operating wireless telephone

systems between an airplane and the ground, and between two airplanes. The fundamental work on radio communication which had already been done enabled the company to assure the Signal Corps that it could successfully accomplish the desired result. Similar requests were received from the navy department with reference to the equipment of their hydro-aeroplanes for telephone service, and the equipment of submarine chasers with radio telephone service. Instantaneous communication between a number of submarine chasers operating together was an essential feature of some of the most promising methods of submarine location, and this requirement could only be met by a satisfactory radio telephone system. Building upon previous fundamental radio work, the engineers were enabled within nine months from the starting of the work to complete the development work, and to arrange for quantity production of the radio telephone equipment desired for both airplanes and submarine chasers. This achievement was due to the skill of the engineers, and would have been impossible without it. They were enabled to accomplish, within a few months, important results which had been needed since the beginning of the war, but which had not been obtained either by our allies or our enemies.

While most of the radio efforts were directed to telephony, there were calls by both the army and the navy for considerable assistance in the production of radio telegraph equipment, especially apparatus for the reception and amplification of signals, and the development of small portable sets for field use.

Shortly after the outbreak of the war, the secretary of the navy created a special board for handling all anti-submarine problems. In addition to regular naval officers, the secretary appointed four advisory members, one of whom was one of the principal engineers of the Bell System. Work on the problem of submarine detection, one of the most vital problems of the war, reached very large proportions and hundreds of engineers of the Bell System were engaged upon it. This work included fundamental studies of the disturbances produced by submarines in motion and at rest; the development of detecting apparatus to be used on the surface and on submarine vessels, either when at rest or in motion, and to be used on airplanes; the development of detecting equipment to be installed at fixed submarine stations connected to the shore by suitable cables, and of signaling and direction-finding equipments, as well as of special transmitters, receivers, amplifiers and circuit arrangements for use with all such detecting apparatus. While technical detail as to results cannot be given here, it may be said that most satisfactory results were obtained.

An interesting and important development made by the engineers of the Bell System was the production of a secret ciphering adaptation of the printing telegraph. This arrangement made possible the easy and rapid sending of telegraph messages in a cipher unintelligible and unbreakable by one not having the key. After being subjected to the most rigid tests by the military cipher experts, this system was placed in use by the Signal Corps several months prior to the conclusion of hostilities. Adaptations of this system are now being made by engineers rendering it available for other than printing telegraph methods of transmission.

One of the largest and most interesting individual problems undertaken was the development of apparatus for the detection and location of invisible airplanes. At the time of the signing of the armistice, the work had progressed so far that the apparatus and equipment developments had made it possible to locate with extreme accuracy the exact position of an invisible airplane and to concentrate the fire of anti-aircraft batteries so that the shells would explode within close proximity to the airplane.

Probably the most carefully guarded of war problems was that relating to the apparatus for locating accurately the position of enemy artillery. Two forms of this equipment were developed, known respectively as flash ranging and sound ranging apparatus. The first of these was relatively simple and involved a visual observation at the time the gun was fired. Considerable quantities of this equipment were developed and manufactured by the engineering department of the Bell System. In the sound ranging apparatus the determination of gun location was the result of observations of the sound produced when the gun was fired. At the time the United States entered the war, this means of accurate location was already being developed by both the English and the French with most promising results. After we entered the war the engineers were asked by the army to carry on this development work in the United States. For nearly a year this work was carried on in laboratories in specially designated and locked rooms which were under guard day and night. Apparatus was developed and produced, shipped to France and placed in use. At the time of the signing of the armistice this apparatus was reported from France to be the best in use by any of the allied forces.

In view of the shortage of labor and material and the marked increase in telephone traffic brought about by the war, the operating companies were confronted with unusual difficulties in giving the service necessary to the successful carrying on of war work in this country. To meet this emergency it was necessary to modify the standard operating methods and practices, and the engineering department, after careful study of all conditions and methods, recommended numerous modifications and special methods which were an important factor in the successful handling of telephone calls during 1918. The ranks of the supervising forces were also depleted by the war, and it was necessary to introduce special methods of supervision, particularly in connection with toll work. The losses from the operating forces during 1918 were about double those of the previous year, and this not only caused a shortage of operators, but also made it necessary to employ a large number of inexperienced people and give them special and intensive training. An important feature of the engineering department's work has been the devising of proper methods of instruction for use under these conditions, and the direct assistance of the operating companies in this work.

Notwithstanding all of the activities of the engineers pertaining to the war, the regular work of the engineering department has been carried on. Development and standardization has continued, and as usual the operating companies have been advised on large or difficult questions as they arose. Special mention should be made of the multiplex telephone and telegraph system. By the multiplex telephone system four telephone conversations over one pair of wires are simultaneously carried on in addition to the telephone conversation made possible by the ordinary

methods of working. Thus over a single pair of wires, a total of five telephone conversations are simultaneously operated, each giving service as good as that provided by the circuit working in the ordinary way.

Heretofore, the best telephone methods known to the art provided only one telephone conversation at a time over a single pair of wires. A number of years ago the "phantom circuit" arrangement was developed, by means of which three telephone circuits are obtained from two pairs of wires, an important improvement which came into extensive use. Now by the new multiplex method, five telephone circuits are obtained over one pair of wires, that is, ten simultaneous telephone conversations from the two pairs of wires which formerly could be used for only three simultaneous telephone conversations. This represents an increase of more than threefold in the telephonic capacity of the wires, as compared with the best previous state of the art, and a fivefold increase under conditions where the "phantom circuit" is not employed.

In telegraphy, as well as in telephony, sensational results have been attained by the new system. Combining two telegraph wires into a metallic circuit of the type used for telephone working, and applying new apparatus and methods to this metallic circuit, have enormously increased the capacity of the wires for telegraph messages. When applied to high speed printer systems they can do eight times as much as is now done, and as compared with the ordinary duplex telegraph circuit in general use can do ten times as much. The increased results are attained without in any way impairing the quality of telegraph working.

The nature of these developments is such that if desired wires may be used partly for telephone and partly for telegraph. A pair of wires is available either for five simultaneous telephone conversations or for forty simultaneous telegraph messages, or partly for one and partly for the other.

From the nature of the apparatus and methods employed, the system is not practically advantageous on short lines, either telephone or telegraph. On long lines its application will be extended immediately, but its introduction must necessarily be gradual on account of the nature of the apparatus required, and the arrangement and adaptation of the lines themselves, and their associated apparatus to the new methods of working. Studies show, however, that this system of multiplex telephony and telegraphy will have great usefulness on long open wire lines. It is not too much to characterize this new system as marking an epoch in the development of long distance telephony and telegraphy.

The new multiplex telephone system has already been applied to a pair of wires between Baltimore and Pittsburgh and has been in service for a number of months, furnishing facilities greatly needed to take care of war business. Further applications of this system are under way in locations where additional long circuits are required.

During the year just passed, perhaps the greatest activity in the Bell legal department has been in its patent division. It is the function of this division not merely by proper patent applications to protect the inventions resulting from the work of the department of research and experimentation, but further to investigate the entire patent field so as to be assured that the rights are acquired and precautions taken which are necessary to prevent any patent complications which would restrict or hamper the development of the art from the engineering point of view. The comparatively recent and epoch-making inventions in multiplex transmission and in other equally important lines, have added to the volume of this work of the patent division, and have emphasized its continuing importance.

At the end of 1918, the Beyy System either owned, controlled or was licensed under 3,211 United States patents and 1,213 applications for such patents, making a total of 4,424. These patents and applications cover the entire known telephone field and may be roughly grouped into (1) a large number covering innumerable improvements in details, which collectively render it possible to vastly improve the character of the telephone service given, and to give this service at a minimum cost, and (2) those more or less fundamental to the rendition of a particular kind of service.

It is not an exaggeration to assert that there is not a practical detail of telephone development which is not represented by some patent under which the Bell System is free to operate.

Tax on Toll Messages

At present all telephone companies are required to collect a war tax for the government of 5 cents on all messages of 15 cents and over. Under the new bill beginning April 1, companies are to collect 5 cents on all messages over 14 cents and less than 51 cents and 10 cents on all messages over 50 cents.

The sections of the new law relative to the tax on toll messages are as follows:

Section 500—That from and after April 1, 1919, there shall be levied, assessed, collected, and paid, in lieu of the taxes imposed by section 500 of the Revenue Act of 1917—

(f) In the case of each telegraph, telephone, cable, or radio dispatch, message or conversation which originates on or after such date within the United States and for the transmission of which the charge is more than 14c and not more than 50c, a tax of 5c; and if the charge is more than 50c, a tax of 10c: Provided, that only one payment of such tax shall be required, notwithstanding the lines or stations of one or more persons are used for the transmission of such dispatch, message or conversation; and

(g) A tax equivalent to 10 per centum of the amount paid after such date to any telegraph or telephone company for any leased wire or talking circuit special service furnished after such date. This subdivision shall not apply to the amount paid for so much of such service as is utilized (1) in the collection and dissemination of news through public press, or (2) in the conduct, by a common carrier or telegraph or telephone company, of its business as such.

(h) No tax shall be imposed under this section upon any payment received for services rendered to the United States or to any state or territory or the District of Columbia. The right to exemption under this subdivision shall be evidenced in such manner as the commissioner, with the approval of the secretary, may by regulation prescribe.

Section 501 (a)—That the taxes imposed by section 500 shall be paid by the person paying for the services or facilities rendered.

It is not likely that there will be any change in the method of having companies report and remit this tax. As under the law now in force official messages of the United States, state, county, township or municipal offices are exempt from the tax.

Recommendations for Chicago

Abolition of the flat rate business lines and the commuted trunk line telephone service was recommended by E. W. Bemis, Chicago's public utility expert, in a report to a subcommittee of the city council committee on gas, oil and electric light.

Mr. Bemis said these services might be held as discriminatory, as new subscribers cannot obtain them. Only business houses which had these services prior to 1913 have them now. There are less than 10,000 of these, Mr. Bemis said.

The commuted trunk line is a service for which $1 a day is paid, regardless of the number of times used. Investigation has shown that these customers enjoy a service at a much lower rate than charged other business houses. The flat rate business lines are charged for at the rate of $125 per year, regardless of the number of outgoing calls.

"It appears that the two rates are discriminatory and that abolition would raise the revenue of the Chicago Telephone Company about $433,000 per year," said Mr. Bemis.

The subcommittee is considering the request of the telephone company for a revision of telephone rates. The state public utilities commission will pass on any agreement made between the company and the city.

Mr. Bemis, in explaining how the revenue of the company could be increased without any general revision of rates, suggested that the company's 5 per cent charge for depreciation be cut to 4½ per cent, and that there be a reduction in the rental charges of the American Telephone and Telegraph Company, the parent concern of the Chicago company.

Under Mr. Bemis' plan the Chicago company would be able to pay 7 per cent per year on its outstanding stock and bonds. He said an 8 per cent return on stock had been averaged in the last few years.

Mr. Bemis declared against entering into a contract ordinance with the company at this time. He said the city ought to wait until conditions have been restored to normal.

Texas Company Has Pension Plan

The Texas Telephone Company, which has headquarters in Waco, Texas, has announced to all its employes the inauguration of a plan of payment of sickness and disability benefits, death benefits and pensions. The company announces that it has set aside a substantial sum of money which will be used only for the purpose of paying such benefits, such fund to be added to by the company from time to time as it is depleted by benefit payments. The plan was made effective February 1, 1919.

The company has given notice to all its employes that beginning February 1 every employe of the company is entitled to participation, without any cost whatever to the employe, in this benefit plan. The plan contemplates payment of several different kinds of benefits, such as for disability through sickness, disability through accident, death from sickness, death from accident, and a pension, which is dependent upon the age of the employe and his or her length of service with the company.

The company has had this plan under contemplation for more than a year, but was unable to put it into effect in 1918 because of other extraordinary and heavy expenses, but the plan has now been approved by the postmaster general and the company is enabled to make it effective. With every salary check sent out by the company on February 1 a notice was also sent to the employe advising him or her that the plan had become effective and containing also this statement:

"The company has established this fund because of its desire to express in some substantial manner its appreciation of the loyal and valued services of its employes, each of whom has done his or her part in the upbuilding of this business, and the successful operation of the company."

New York's Police Wireless

Acting police commissioner of New York received in December a report of the work done by the wireless telegraph branch of the police department during the past two years. The wireless tower is on the roof of the police headquarters building, and the seagoing end of the service is aboard the police boat "Patrol," which covers the harbor and rivers which bound New York. The report shows that merchandise valued at upwards of $400,000 and some twenty-five lives have been saved mainly through information received by wireless. About 2,000 messages have been handled by the service. Headquarters has been able to receive messages from a distance of 1,500 miles, and to transmit them 300 miles.

Minnesota Bill Protested

A committee representing the Minnesota Telephone Association appeared before the senate at the state capitol to present the telephone company's side of the eight-hour work bill.

Telephone association authorities claim that the bill is impractical. The bill would require telephone companies in small towns to employ four shifts instead of three as now, and to change shifts in the middle of the night.

Another objection is that it provides that operators shall not spend intermission periods in the telephone rest rooms.

Telephone Part of Farm, Court Says

A mutual line telephone, paid for and installed in a residence, is real estate, even though the owner has been paying personal property taxes on it for years. This was the decision of a jury in a case before Martin Bradford, justice of the peace at Junction City, Kas. The case grew out of the separate sale of a farm and the farm's telephone. William Schaffer purchased a farm from John Lang. After the deal was made Lang sold his telephone to August Johnson. Schaffer brought suit to recover for the telephone, which, he alleged, was a part of the real estate property. The jury upheld the plaintiff.

Senate Committee Says December 31

The senate postoffice committee reported favorably the resolution of Chairman Bankhead providing for termination of federal control of telegraph, telephone, and other wire utilities next December 31. A similar resolution is pending in the house.

The commissioner of internal revenue has ordered that on and after April 1, a tax of 10 cents must be paid on all toll line messages where the charge is 51 cents or over, and 5 cents tax on such messages where the charge is under 51 cents. The present tax is 5 cents on all calls of 15 cents or more.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

Florida

A DECISION handed down in the circuit court at Jacksonville restrained the Southern Bell Telephone and Telegraph Company from collecting telephone tolls as recently prescribed by Postmaster-General Burleson. The suit was brought by the Florida Railroad Commission, which claims jurisdiction in prescribing rates to be charged for telephone service in the state of Florida.

Illinois

Frank G. Ewald, chief engineer of the public utilties commission of Illinois, in a letter to public utility companies outlines an excellent policy of handling complaints.

As a result of the commission's experience extending over a period of five years in meeting various problems involving the relations of public utilities with the public, we have become very strongly impressed with the large influence which the quality of service rendered and the methods of handling complaints exert upon the character of this relationship with the public.

During the recent times of stress, with the attendant scarcity of labor, there has been a tendency on the part of utilities to decrease the standard of service rendered, possibly with a view to more economical operation and possibly because of inability to adequately supervise the work of strange employes necessarily employed. In so far as such a policy may have been intended, we believe that it is most unwise and that instead of operating to relieve the utility of its burdens, it will greatly increase them. We have seen this repeatedly proven during the past year.

Through the handling of complaints most utilities find their only opportunity of meeting their consumers. This is unfortunate, because the utility gains its impression of its consumers through these complaints, which are often presented at times when the consumer is aggravated, and, on the other hand, the consumer gains his impression of the utility through the methods by which the complaint is handled.

With the utility, the handling of complaints is a routine transaction which occurs with regularity, and the employes engaged upon this phase of the work come to regard the complaints merely as a part of the company's routine work which is capable of being handled by routine methods in much the same manner that material is passed through the stock room. With the consumer, however, a complaint is not a routine matter, but represents to him a real grievance. In other words, utilities are apt to regard a complaint as lacking individuality, while from the consumer's standpoint each complaint has a very distinct individuality and stands out in his mind as a particular situation which merits individual attention.

We have been frequently impressed with the fact that if a utility is willing to accord to each complaint an individuality and give it a just investigation, both from the consumer's and the utility's viewpoint, the complainant is well satisfied and, as a result of his contact with the company, has an appreciation of its human characteristics and a regard for its sincerity of purpose. A routine reply to some classes of complaints may be suitable, but its routine nature will usually impress the complaint unfavorably.

The problem as to the future of public utilities is one which occupies considerable attention in the public mind today, and is one which is of vital importance to the utility and to the public. We believe that much of the criticism directed against utilities and which, in a certain measure, reacts against the regulatory bodies charged with their supervision, might be relieved by a broad-minded policy of handling complaints in which each case is treated as an opportunity for acquaintanceship with the consumer and each complaint is given an individuality and impartially investigated.

As the responsible executive of a utility, I hope that you will give the subject matter of this letter careful consideration. It is presented as a helpful suggestion regarding a vital matter and with the further idea that in many cases the operating heads of utilities inadvertently allow themselves to get out of touch with working details, some of which have a very important bearing upon the development of this complicated situation.

In a recent order the utilities commission, authorized the Automatic Home Telephone Company of Pontiac to purchase telephone lines and Exchange at Pontiac from the Central Union Telephone Company. The Automatic Company also is authorized to issue $125,000 in securities.

Rates fixed in the order follow:

Individual business, $36.

Individual residence, $24; two-party business, $30; two-party residence, $21; four-party residence, $18; ten-party rural business, $24; ten-party rural residence, $18.

The Independent Telegraph & Telephone Company was authorized by the Illinois Public Utilities Commission to issue first mortgage, 6 per cent gold bonds in the amount of $13,500 and the execution of its deed of trust to the Sangamon Loan & Trust Company of Springfield to secure said issue of bonds.

Indiana

As the result of the resumption of state control of telephones, through the Indiana Public Service Commission, following the decision of Judge Ewbank, of Indianapolis, the old toll and long distance rates, in effect before the government took over the telephones, are again in force.

Injunctions had been filed against the Union Central Telephone and the Indianapolis Telephone Companies, both of Indianapolis, and Judge Ewbank, of the Marion County circuit court, decided that the rates and tolls charged under the Burleson order, since Judge Anderson's decision, were illegal. The public service commission immediately resumed complete jurisdiction, following Judge Ewbank's ruling, and this is the reason resumption of the basis of rates and tolls, followed the decision of the judge of the circuit court of Marion County.

The Public Service Commission at Indianapolis announces:

"The practical effect of Judge Ewbank's decision is that the public service commission of Indiana has authority to continue to regulate telephone rates in Indiana, and that Postmaster-General Burleson does not have authority to fix or regulate rates within the state. Burleson's toll rates which have been collected since the recent hearing before Judge

Anderson are, under Judge Ewbank's decision, illegal. The installation and moving charges which were initiated by Mr. Burleson in December are likewise illegal, for the reason that they have not been approved by the commission.

"The commission will continue to function and exercise complete jurisdiction over telephone matters as it has done since the public utility act was passed. It will regulate telephone rates and service, regardless of Mr. Burleson's orders.

"While the nation was prosecuting the war, the Indiana commission sought to co-operate to the fullest extent with the national effort along all lines. It willingly set aside its own rights and permitted the federal government to assume jurisdiction over many matters which legally were within the power of the state to reguate and control. With the virtual ending of the war the commission could not, however, in justice to the people of the state of Indiana, continue to permit the federal war control of telephones to be perverted and exercised for the purpose of carrying out the personal schemes of Mr. Burleson for federal ownership nor permit him to so entangle the telephone situation as to make it impossible to do anything but accept nationalization or federal ownership as a fixed governmental policy."

The Public Service Commission made public the application of the Citizens Telephone Company of Terre Haute, and the Central Union Telephone Company for permission to merge the two plants on the basis of the merger.

In the words of the application the matter takes care of the sale of a telephone exchange having 5,200 connected subscribers to a telephone company operating an exchange and having 8,200 connected subscribers in the same city. The commission was asked:

To consider the securities which the companies have agreed in exchange therein, to determine the amount by appraisal, and for the consent of the commission for the issue of such securities.

To agree on a plan to fix a sale value of the exchange and system.

The commission announced approval of the application to consolidate the companies. However, the commission refused to approve the issue of securities which both companies have agreed upon, in advance of the appraisal, and also refused to approve in advance the value of the sale which might be fixed.

The public service commission canceled its order issued last September approving in Indiana the telephone installation charges ordered by Postmaster-General Burleson. Certain charges for moving a telephone from one place to another in the same house also were included in the order.

It was explained that when the commission approved the charges it did so because the war was in progress, and while it doubted then the authority of the federal administration in the matter it consented to the action because it did not wish to stir up trouble which might interfere with the prosecution of the war.

Now a different situation obtains, it is said, and the commission withdraws its approval. The commission did not approve the modification of the charges directed by the director general in December.

The commission ordered all telephone companies in Indiana to rebate the excess charges last Monday but Postmaster Burleson immediately filed injunction proceedings to prevent the commission from forcing the compliance of the order. Judge Anderson granted the injunction.

The Supreme Court has handed down a decision sustaining L. A. Frazee in his long contention with the Public Utilities Commission, in the matter of the telephone rates in Fayette County. The case began four years ago last June, when a hearing was held.

The contention of the citizens, who stood in the relation of complaining witnesses, was that the telephone rates were too high for the service rendered, and that the earnings of the company were too great for the investment. The commissioners rendered a decision which was hailed as a victory for the complainants, since it insisted upon numerous points of service, made substantial decreases in some terms of rates, and in still other respects granted the petitioners the chief part of what they had asked for.

With that stage of the case it passed out of the hands of the patrons of the company, and became a contest between the Public Service Commission and Mr. Frazee. The case went into the Circuit Court, was taken to Rushville on a change of venue, was heard by Judge Sparks, who rendered a decision sustaining every important claim of Mr. Frazee and the company. From this decision the commission took an appeal to the Supreme Court, which got to the matter, in course of time, and the decision of which, just handed down, is supposed to put the whole case, at least in its present form, entirely at rest.

The changes which the commission enforced in its first order never were put into effect, the decision being contested from the outset, so that the decision just handed down implies no change in the rates as they stand.

Kansas

John M. Kinkel, chairman of the Kansas Public Utilities Commission, announced that hearing before the supreme court to determine the legality of the Burleson increased telephone rates, may be held in April instead of October, as announced from Washington.

Attorneys representing the Kansas commission have secured an agreement with the United States attorney general for a joint request for an immediate hearing of the importance of the case. Kansas will be joined in its suit by other states.

Massachusetts

The full bench of the state supreme court dismissed a petition of the Massachusetts Public Service Commission against the New England Telephone & Telegraph Company by which the commission sought to compel the company to cancel toll rates ordered by Postmaster-General Burleson and to return to the schedule in exject prior to January 21. The court held that the United States is a party involved and could not be sued.

Minnesota

The telephone tangle at Frost was unraveled at a hearing conducted by J. W. Howatt, telephone supervisor to the State Railroad and Warehouse Commission. A complete municipal exchange is to be installed and negotiations are pending to connect the farm lines with it.

The telephone exchange at Frost consisted of a switchboard in the newspaper office from which lines running to a nearby pole were owned by the editor.

Subscribers ran their own lines from the pole, provided their own telephones and paid the editor a small amount for maintaining the switchboard. Numerous farmers built lines to connect with the novel exchange. Then the village council undertook to establish a municipal telephone system. The farmers withdrew and established an independent switchboard outside the village limits, with the result that communication between village and rural subscribers was cut off.

The council began proceedings to condemn the telephone lines in the village and asked the sanction of the state commission.

Rep. J. I. Levin, St. Paul, introduced a bill in the house of the legislature that makes it unlawful for any telephone company to purchase or acquire property, franchise or rights of any other telephone company doing business in the state without first obtaining the consent of the railroad and warehouse commission.

The owner and proposed purchaser of such properties shall both apply to the Railroad and Warehouse Commission for approval of such transfer, according to the provisions of the bill.

In the case of a corporation desiring to sell all of its property, it shall require a vote of a majority of its stockholders to ratify the same, provided, however, that both companies may sell any property not used by telephone companies in the conduct of their business at the time of sale without the permission of the commission.

The bill goes to the committee on public utilities for reference.

The Brownsdale Telephone Company is permitted to place in effect, as of April 1, 1919, the following schedule of exchange rates for local telephone service at Brownsdale, Waltham and Sargeant, Minnesota:

Brownsdale	Per Month
Individual Line, Business, gross	$2.25
Individual Line, Residence, gross	1.75
4-Party Line, Residence, gross	1.50
Rural, Multi-Party (company owned), gross	1.50
Extension Telephones, net	.25
Extension Bells, net	.15
Waltham and Sargeant	
Multi-Party, Business, metallic service, gross	2.25
Multi-Party, Residence, to be classed as Brownsdale rural service, gross	1.50

All rates to be billed gross except where quoted net. All gross rates to be payable monthly in advance, with a discount of 25 cents per month if paid on or before the 15th of the month in which the service is rendered, excepting company rurals, which rates are payable quarterly with a discount of 75 cents if paid on or before the 15th of the first month of the quarter; a discount of 50 cents if paid on or before the 15th of the second month of the quarter, and a discount of 25 cents if paid on or before the 15th of the third month of the quarter.

Nebraska

Officials of the Kenesaw Telephone Company, who desired the state railway commission to authorize a $7,100 stock issue to repay them for sacrifices made in the past, in the days before state regulation, had their claim cut to $3,500. Two of the officers asked for $360 a year for fourteen years and there were a few others who desired to participate. The company was organized with a capital stock of $10,000, later increased to $20,000, of which $9,925 was issued. It has paid 8 per cent dividends in the past, and $20,000 represented the book value of its assets. The company has not cared for depreciation in the past, so that its plant is now figured by the commission engineer to be worth $13,425. The $3,500 stock issue authorized will bring the stock up to this figure. The company was authorized to pay 8 per cent dividends.

The state railway commission has granted the application of the Bertrand Telephone Company for an increase in rates, as follows: Business, $2.50; one-party residence, $1.75; four-party residence, $1.50; farm, $1.75, subject to a discount of 25 cents if paid in advance. Switching charges are to be 60 cents a month, less 10 cents a month for advance payment. Desk sets are 25 cents additional and extension 50 cents. The commission, in December, denied the application, but now finds it has made a mistake in computing past dividends. As a matter of fact these have been put 7 per cent. The order says that the owner shall be restricted to a return of $1,200 a year, and that if at any time the surplus exceeds $1,200 there shall be a reduction of 5 cents a month in the rates.

It is therefore ordered by the Nebraska State Railway Commission that the Pawnee Telephone Company of Pawnee City, Nebraska, be and the same is hereby ordered and directed to submit to the commission on or before March 29, 1919, a comprehensive plan for the rehabilitation of the present exchange switchboard located in the company's central office in Pawnee City.

It is further ordered that the defendent company be and the same is hereby ordered and directed to maintain three operators on the main switchboard, exclusive of the toll operator, during the hours of 7:30 a. m. and 7:30 p. m. on week days.

It is further ordered that the defendant company be and the same is hereby ordered and directed to temporarily employ a wire chief who is competent to superintend and assist in the rehabilitation of the switchboard and central office equipment now maintained by the defendant company in its central office in Pawnee City, Nebraska.

It is further ordered that an emergency exists and that this order shall be in full force and effect from and after the date of the same.

The Nebraska railway commission has authorized the Araphoe Telephone Company to remove the telephone from the home of C. W. Rector, because he jingled the bell every time he heard German spoken on the line. The commission holds that there are no regulations to prevent German being used over the telephone.

North Dakota

On January 30, the railroad commission made the following order requiring the Northwestern Telephone Exchange Company to continue to furnish Tri-State service without a charge therefor where there was a duplication of telephones:

"It is, therefore, ordered that the telephone company, on and after February 1, 1919, desist from collecting duplicate telephone charges, wherever the service of the Northwestern telephone exchange and the Tri-State telephone and telegraph exchanges are now duplicated; but that the defendant continue to furnish service through both exchanges to such patrons until such time as the exchanges are consolidated.

"It is further ordered that physical connection between the telephone systems be completed by defendant at a date not later than the 1st day of June, 1919."

Upon application to District Judge Chas. M. Cooley, it was ruled that this order by the railroad commission was an order regulating service and hence should be suspended pending the appeal which had been taken from the order; there was some discussion whether or not an appeal would be taken from Judge Cooley's order and the matter was submitted to the attorney general who, through Mr. Packard, who has been in charge of these hearings, has approved the order of Judge Cooley and has advised City Attorney George A. Bangs that an appeal would not be taken.

Among other things, Mr. Packard says: "The judge's view that this order was in regulation of service rather than rates appears to me to be correct. In any event, your stipulation protected the customers' rights, if they have any rights."

Ohio

Common Pleas Judge Kinkead made permanent an injunction preventing the Ohio State Telephone Company from collecting the new toll schedule.

Suit was filed by Attorney General Price on behalf of the Public Utilities Commission and the case was submitted to Judge Kinkead upon a demurrer of the plaintiff to the answer of the company.

The state public utilities commission fixed the valuation of the Ohio State Telephone Company property, Toledo, at $3,017,325.77.

The commission deducted $71,761.32 from the valuation, previously allowed for attaching business. The deductions were made in conformity with the rulings of the state supreme court in the Cleveland Electric Illuminating valuation case.

An appraisal of the company's property was made by the telephone company and last summer checked up by representatives of the utilities commission. The utilities commission ordered the appraisal made after Mayor Schreiber protested against granting of higher rates the company sought.

The commission also fixed the valuation of the Ohio State Telephone Company Cleveland property at $4,080,228.84, making a reduction of $108,052.53.

Oklahoma

The Southwestern Bell Telephone Company was enjoined from further enforcement of Postmaster General Burleson's control over its property in Oklahoma by District Judge George W. Clark at Oklahoma City.

As officials, individuals or agents of the postmaster general, the officers of the company are restrained from charging or exacting any rate in excess of those fixed by the corporation commission.

An application by the company to the court to suspend the injunction on a supersedeas bond pending appeal was denied by the court. The company, through its attorneys, excepted and gave notice of appeal to the supreme court of Oklahoma.

The hearing was on application for a temporary injunction brought by S. P. Freeling, attorney general, charging that the company was exacting illegal rates for sending toll messages over their lines and also charging excessive rates for installation as well as for other services. The right of the postmaster general to enforce the rates in conflict with the corporation commission's orders was denied by the attorney general.

Washington

The Public Service Commission approved the increased rates scheduled by the Pacific Telephone & Telegraph Company to become effective March 1. The increase is approximately 20 per cent.

The new rates mean that householders who talk over a four-party line will pay $2.50 per month for the privilege, instead of $2.25 as in the past and the 25 per cent discount granted those who paid before the 10th of the month is discontinued.

The rate for two-party telephones advances from $2.50 to $3 a month, with no discount. Discounts never have been given on two-party telephones.

One-party telephones advance from $3 to $3.75 a month; no discount. Like the two-party telephone, one-party telephones have not been subject to discount.

Twenty-five cents a month is added for desk telephones, on four, two and one-party lines.

Business telephones advanced from $7.50 to $8.50 a month for wall telephones and $8.75 for desk telephones.

Five cents will continue to be the price in vogue in the pay stations for city calls. However, the merchant with a pay telephone in his place of business will hereafter receive none of the money deposited in the telephone. In the past he has received 70 per cent of the money deposited. Hereafter the telephone company will take 100 per cent.

The rate of $4.50 a month to the merchant for such a telephone continues as in the past.

On private branch exchanges there is an increase of less than 5 per cent a month.

The new telephone rates were granted by the state Public Service Commission. Postmaster General Burleson has agreed to adopt the suggestion of the state Public Service Commission that the new rates be effective March 1, rather than December 6, 1918.

By formal order of the public service commission the modified increase of telephone rates adopted for Spokane becomes effective April 1. By stipulation Opportunity is included within the Spokane primary rate base area. All contracts in conflict with the new rate are canceled by order of the commission.

In an analysis of telephone operation statistics, the commission includes a telephone service comparison, which credits Seattle with 63,504 telephones, Spokane 24,002 and Tacoma 17,082.

Spokane's actual justification for modified treatment in the matter of rate increase is shown in a telephone gain of 3.25 per cent in Seattle, 1.27 per cent in Tacoma and a loss of 2.59 per cent in Spokane last year. That this loss was altogether due to decreased population was not maintained, allowance being made for an uncertain percentage of patrons who had discontinued service as a result of the unsatisfactory telephone situation in Spokane.

Commission findings on Spokane rates are based on a valuation of $3,641,730, which includes $132,000 on property of the absorbed automatic system.

Under present rates the telephone company's estimated income from Spokane for 1919 is estimated at $769,200; under the proposed rates, $867,850, or a total increase of $82,550. The balance net revenue figured for the current year under proposed rates is $46,050, which leaves the federal administration a loss of $138,966 under its guaranteed compensation to the company. Under present rate the federal loss on operation in Spokane for the year is fixed at $237,616. The government's guaranteed compensation to the company for the year is $222,716, which must be paid under the federal control operating contract regardless of how little or much revenue is collected.

Wisconsin

When the Independent telephone company bought out the plant of the Bell company in La Crosse, it added 330 subscribers to the Independent list, paying $33,919 for the plant, with $106,000 for lines, cables and conduits. These figures were among those presented by the company to support its demand for increased rates, in a hearing before the railroad commission.

By a vote of 4 to 3 the Darlington board of education tabled a petition from the graded and high school teachers asking a raise, amounting to two weeks' salary for the entire year.

The Eagle River Telephone Company of Rhinelander has been authorized by the railroad commission to increase the rentals on telephones.

European Telephone Practice

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

ADAPTATION of Telephone Exchanges to Telephone Traffic.— The problem of adapting the size and equipment of a telephone exchange to the needs of telephone traffic under the varying conditions introduced by seasons and times of the day is of great importance for the efficient working of the exchange.

To obtain a measure for the efficiency of the exchange, we have to go back to the fundamental aim and purpose of the telephone exchange: A subscriber wishes to talk with another one. To do this he will have to be connected by way of the exchange, no matter whether he uses the services of an operator, sets his own number on the automatic telephone, or has the service of a semi-automatic system. The exchange will be said to give good service, if it only misses one call among 4000 through having the line busy; on the other hand we will say that the service is poor, if this should happen every 20 or 30 calls.

The standard for measuring the efficiency may be called the "probability of the subscriber to have his call connected by way of the exchange." We must find a mathematical definition for this magnitude. This we have, if the following three problems are solved:

1st. If a large number of subscribers of S number makes C number of calls, then the small group of s subscribers makes c number of calls with the probability w. How large is w? This we may call the probability of variation of quantity. For example: If 10,000 subscribers make 15,000 calls, then 100 subscribers make 50, 100, 150, 200, 300 calls with what probability w?

2nd. If a telephone exchange, in which S number of subscribers make C number of calls, is divided into groups of S_1, S_2, S_3 ..... subscribers, with what probability will s_1 calls pass to group S_1, s_2 calls to group S_2 .... etc. This we might call the probability of variation of direction of calls. For example: If 10,000 subscribers make 15,000 calls and if the exchange is divided into 10 groups of one thousand each, with what probability w will 500, 1000, 1500, 2000, 2500 calls pass to any one of the individual groups of a thousand subscribers connections?

3d. If in a telephone exchange S number of subscribers, who are divided into $S_1+S_2+S_3+\ldots\ldots=S$-groups make C number of calls, and if the number s_1 calls pass to group S_1 for which purpose v_e connections have been provided, with what probability w will a connection succeed? This we might call the probability to make connections. For example: 10,000 connections are divided into 10 groups of 1000 subscribers each. Every two groups of thousand connections are interconnected by 10 inter-group trunks. With what probability will a connection be made if 750, 1000, 1250, 1500 calls are to pass towards this group of thousand connections?

The following theoretical computations will offer a solution for the first and second problem, and as far as known, this is the first detailed attempt to do so. The third problem has been treated before and reference will be made to some other solutions along these lines.

To make the estimates and answers the questions thrown up in the previous paragraphs, we have to use the mathematical theory of probability. Just to review briefly the theory of this branch of mathematics, we can say that the theory of probability treats with the likelihood of any particular form of an event occurring one certain way, estimated on the ratio of the number of ways that this form of event might occur in any other form. Or we might also say that it is the ratio of frequency of that form of event to the entire frequency of the event in all possible forms. Thus, for example a die, thrown up, may fall equally well with any of its six faces up; there are six ways of happening. The ace, however, can only turn up in one way; consequently the chance of that ace is ⅙.

Theory of Variation of Quantity: The first problem was: If S subscribers make C calls, with what probability w will s subscribers make c calls. A probability is a real positive fraction, whose numerator represents the number of cases favorable to the event, whose denominator represents the number of cases of possibility for the event. An example will make this a little clearer. Let us assume, that S=10,000; C=15,000; s=100; c = 150. In how many ways can 100 subscribers make 150 calls? Evidently it is possible that 1 subscriber could make 150 calls and the rest of the 99 subscribers could make no calls at all. It is also possible that 50 subscribers each make one call and that the other 50 subscribers each make 2 calls, which would make 50 for the first group and 100 calls for the second group. Each case is favorable, if the total number of calls of the 100 subscribers is 150 calls. We must therefore solve the problem: In how many ways can we divide the number 150 into 100 individual sums, each of which is a positive whole number and equal or greater than zero.

The 100 sums correspond to the 100 subscribers; each sum is the number of calls made by a subscriber and the sum of these calls must be equal to 150. The solution of this division of sums is known. The evaluation of the 100-place polynomial $(a+b+c+d+\ldots.n)^{150}$ is equal to

$$c+d\ldots n)^{150}=\binom{150}{0}a^{150}\,b^0\,c^0\,d^0\ldots n^0+\binom{150}{1}a^{\overline{149}}\,b^1\,c^0$$

$$d^0\ldots n^0)+\binom{150}{1}a^{149}\,b^0\,c^1\,d^0\ldots n^0+$$

$$\binom{150}{1}a^{149}\,b^0\,c^0\,d^1\ldots n^0+\text{etc.}$$

The sum of each of the 100 exponents of each member of the right side according to the theory of the polynominal theorem must be equal to 150. We can therefore divide the number 150 as often into 100 sums>0, as the valuation of the 100-membered polynominal $(a+b+c+\ldots n)^{150}$ has members. The log,

$$\frac{249}{99}=71{,}3847\cdot Z^1,$$

in other words is a 72-place number.

The number of cases favorable to the meeting of the first problem is represented by a product of two factors. One of these factors states the number of ways in which s subscribers can make c calls; the other factors state, in how many ways the rest S-s subscribers can make the rest of the C-c calls. The product of both factors is the

number of favorable events. For it is obvious, that with every individual division of c calls into s-number of sums, all the different probabilities of dividing the other C-c calls into S-s sums can occur in any number of different combinations.

Corresponding to equation 2, the number c in s sums can be either >0, positive and of unit numbers and can be divided in $\frac{c+s-1}{s-1}$ ways. The product of these two expressions is the total number of all probabilities, that s subscribers make c calls, while at the same time S-s subscribers make C-c calls. That, however, is the numerator Z of the fraction of probabilities:

$$Z=\left(\frac{c+s-1}{s-1}\right)\left(\frac{C\text{-}c+S\text{-}s-1}{S\text{-}s-1}\right)\ldots.(3)$$

In the example $S=10{,}000$, $C=15{,}000$, $s=100$, $c=150$ Z becomes equal to

$$Z=\left(\frac{249}{99}\right)\left(\frac{24{,}749}{9899}\right)$$

The log of $Z=1935,\ldots.Z$ therefore is nearly a 1936-place number.

The question now arises, how many cases are possible. Theoretically it is possible that the 100 subscribers do not make any of the 15,000 calls, but it is also just as possible theoretically, that they make all the 15,000 calls. The sum of all these cases, that they make either none, or one, or two, or all these calls amounting to 15,000, is the total sum of the theoretic possibilities and is therefore to be considered as the denominator of the fraction of probability.

If we designate the number of calls of the s subscribers by x, then these s subscribers make the x number of calls in agreement with equation 2 in $\frac{s-1}{x+s-1}$ number of ways, while the S-s subscribers make the other C-x calls in $\frac{C-x+S-s-1}{S-s-1}$ number of ways. The numerator will therefore receive the following form:

$$N=\sum_{x=0}^{c}\left(\frac{x+s-1}{s-1}\right)\left(\frac{C-x+S-s-1}{S-s-1}\right)=\sum_{x=0}^{c}N_x \qquad (4)$$

in which x assumes all positive whole number values from 0 to C.

If therefore S subscribers make C calls, then s subscribers make c calls with the probability:

$$w_c=\frac{\left(\frac{c+s-1}{s-1}\right)\left(\frac{C-c+S-s-1}{S-s-1}\right)}{\sum_{x=0}^{c}\left(\frac{x+s-1}{s-1}\right)\left(\frac{C-x+S-s-1}{S-s-1}\right)} \quad \ldots \quad (5)$$

in which x assumes all positive whole number values from 0 to C.

With equation 5, we have solved the first problem. But this equation is not at all suitable for a proper valuation. If, for example, $C=15{,}000$ calls are made, then the denominator has 15,001 units. We have to see first how we must handle the equation 5.

If we use the general denominator member of equation 5 and set:

$$N_x=\left(\frac{x+s-1}{s-1}\right)\left(\frac{C-x+S-s-1}{S-s-1}\right) \quad \ldots \quad (6)$$

and if we then substitute for x $(x+1)$, we obtain

$$N_{x+1}=\left(\frac{x+s}{s-1}\right)\left(\frac{C-x+S-s-2}{S-s-1}\right)$$

We then form the quotient:

$$\frac{N_{x+1}}{N_x}=\frac{\left(\frac{x+s}{s-1}\right)\left(\frac{C-x+S-s-2}{S-s-1}\right)}{\left(\frac{x=s-1}{s-1}\right)\left(\frac{C-x+S-s-1}{S-s-1}\right)}$$

The right side substituted by the rule:

$$\frac{(d-b)!\,d}{!\,b}=\frac{d}{b}$$

will give

$$\frac{N_{x+1}}{N_x}=\frac{(x+s)!}{(s-1)!\,(x+1)!}\cdot\frac{(C-x+S-s-2)!}{(S-s-1)!\,(C-x-1)!}$$
$$-\frac{(s-1)!\,(x)!\,(S-s-1)!\,(C-x)!}{(x+s-1)!\,(C-x+S-s-1)!}$$

The factors $(s-1)!$ and $(S-s-1)!$ occur both in the numerator and in the denominator, can therefore be cancelled. The rest of the members can be arranged in a better way as follows:

$$\frac{N_{x+1}}{N_x}=\frac{(x+s)!}{(x+s-1)!}\cdot\frac{x!}{(x+1)!}$$
$$\frac{(C-x+S-s-2)!}{(C-x+S-s-1)!}\cdot\frac{(C-x!)}{(C-x-1)!}$$

It is obvious that the expressions within the parentheses of the numerator often differ from those within the brackets of the denominator only by ± 1. But since $(a+1)!=a+1$, we obtain the equation:

$$\frac{(a+1)!}{a}$$

$$\frac{N_{x+1}}{N_x}=\frac{(x+s)\ (C-x)}{(x+1)\ (C-x+S-s-1)} \quad \ldots \quad (7)$$

As long as in the equation 7, the right side >1, $N_{x+1}>N_x$; if the right side $=1$, then $N_{x+1}=N_x$ and if the right side <1, $N_{x+1}<N_x$. The right side becomes $=1$, if $(x+s)\ (C=x)=(C-x+S-s-1)$. This equation can be transformed easily into:

$$x=\frac{Cs-C-S+s+1}{S-2} \qquad (8)$$

This is an equation of the first degree. The denominator curve $f(N)$ has only one single point, for which $N_{x+1}=N_x$. This point can be either a maximum or a minimum or a turning point. Corresponding to equation 7, $N_{x+1}>N_x$ as long as $(x+s)\ (C-x)>(x+1)\ (C-x+S-s-1)$ or else as long as

$$x<\frac{Cs-C-S+s+1}{S-2}$$

Since the right side contains only constants, it means that $N_{x+1}>N_x$, as long as x is smaller than a constant. The denominator curve therefore rises steadily on the one side, up to the abscissa value of equation 8.

A similar study will show that $N_{x+1}>N_x$, if x becomes larger than the constant on the right hand side in equation 8. The denominator curve $f(N_x)$ has only one maximum for the abscissa of equation 8. If then in equation 8 we can neglect the sums of $(C-S+s+1)$

against the product Cs without any serious error, and if we can neglect the magnitude 2 against S, the equation 8 is transformed into equation

$$x=\frac{Cs}{S} \text{ or } \frac{X}{s}=\frac{C}{S} \quad . \quad . \quad . \quad (9)$$

Equation 9 is very important. As we will see later, equation 9 proves that if 10,000 subscribers make 15,000 calls, 100 subscribers will make 150 calls with the maximum probability involved in the question. The probability that they will make more or less calls than 150 is therefore much smaller.

If we go back to equation 5 and designate the numerator by $Z^{\cdot\cdot}$ and the members of the denominator by $N_{x=0}$, $N_{x=1}$, $N_{x=2}$, etc., the equation 5 passes over into equation:

$$w=\frac{Z}{\sum_{x=0}^{C}(N_{x=0}+N_{x=1}+\ldots)} \quad . \quad . \quad . \quad . \quad . \quad (10$$

or:

$$=\frac{1}{\frac{N_{x=0}}{Z}+\frac{N_{x=1}}{Z}+\frac{N_{x=2}}{Z}+\ldots+\frac{N_{x=c}}{Z}} \quad . \quad . \quad (10a)$$

Further points can be best explained by using an actual example. Problem No. 4 reads: $S=20{,}000$ subscribers make $C=30{,}000$ calls. With what probability will a group of $s=100$ subscribers make 147.5 calls?

The desired probability will have to be figured from the equation: $w_{c=147{,}5}$

$$=\frac{\binom{147{,}5+100-1}{100-1}\binom{30\,000-147{,}5+20\,000-100-1}{20\,000-100-1}}{\sum_{x=0}^{30\,000}\binom{x+100-1}{100-1}\binom{30\,000-x+20\,000-100-1}{20\,000-100-1}}$$

$$=\frac{\binom{246{,}5}{99}\binom{49\,751{,}5}{19\,899}}{\sum_{x=0}^{30\,000}\binom{x+99}{99}\binom{49\,899-x}{19\,899}}=\frac{Z_{c=147{,}5}}{\sum_{x=0}^{30\,000}N_x}$$

First of all we get a picture how the denominator curve N_x runs. According to equation 8, the denominator curve has a maximum value at:

$$x=\frac{Cs-S-C+s+1}{S-2}=\frac{30\,000\cdot 100-20\,000-30\,000+100+1}{20\,000-2}$$
$$=147{,}5$$

The value for $N_{x=147{,}5}$ would have to be figured from the equation: $N_{x=147{,}5}=$

$$\binom{147{,}5+100-1}{100-1}\binom{30\,000-147{,}5+20\,000-100-1}{20\,000-100-1}$$
$$=\binom{246{,}5}{99}\binom{49\,751{,}5}{19\,899}$$

But logarithmic tables for faculties up to 1200 are very rare. Anything beyond that is even worse and would have to be figured out specially by the use of Stirling's formula:

$$\left.\begin{array}{l} n!=n^n\ e^{-n}\sqrt{2\pi n} \text{ as for example} \\ 100!=100^{100}\ 2.71828^{-100}\sqrt{200\pi} \end{array}\right\} \quad (11)$$

These potentials in the Stirling formula can be computed with the aid of the ordinary logarithmic tables. But this also is inconvenient, as large numbers like the one above of 49,751! would have to be computed with ten place tables. But experience showed that 10-place logarithmic tables are too troublesome to use, while the 7-place tables are not accurate enough. In order to obviate this difficulty another way is possible through the use of equation 7 and 10.

It will be noted that $N_{x\ max}=N_{x=147{,}5}=Z_{c=147{,}5}$. Consequently the fraction

$$\frac{N_{x=147{,}5}}{Z_{c=147{,}5}}$$

in the denominator equation 10a becomes equal to 1. Starting out from this unit point we build up the denominator curve of equation 10 with the aid of equation 7. If we compute first of all an auxiliary curve according to equation 7:

$$\frac{N_{x+1}}{N_x}=f(x)=\frac{(x+100)\ (30{,}000-x)}{(x+1)\ (49\,899-x)}$$

for all value of $x=0$ to $x=30{,}000$.

We begin with the value $x=147.5$. By substituting the value x=147.5 we obtain:

$$f(147{,}5)=\frac{247.5-29\,852.5}{148.5-49\,751.5}=1.$$

For $x=150$ we have $f(150)=0.9934$
For $x=155$ we have $f(150)=0.9807$
For $x=200$ we have $f(200)=0.8951$
For $x=145$ we have $f(145)=1.007$
For $x=140$ we have $f(140)=1.021$
For $x=100$ we have $f(100)=1.189$

We can now compute:

$\frac{N_{x+1}}{N_x}=f(x)$; hence $N_{x+1}=N_x\cdot f(x)$

$\frac{N_{x+2}}{N_{x+1}}=f(x+1)$; hence $N_{x+2}=N_x f(x)f(x+1)$

$\frac{N_{x+3}}{N_{x+2}}=f(x+2)$; hence $N_{x+3}=N_x f(x)f(x+1)f(x+2)$

Fig. 1 shows that the value $f(x)$ does not differ very much from the value $f(x+1)$, and $f(x+2)$ does not differ very much from $f(x+1)$, as for example:

$f(149)=0.0061$
$f(150)=0.9934$
$f(151)=0.9908$

Consequently $f(149)\cdot f(150)\cdot f(151)=0.98035$ and $[f(150)]^3=0.98030$.

We can therefore compute without great errors:

$$\frac{N_{x+5}}{N_x}=[f(x+2.5)]^5 \text{ or } \frac{\frac{N_{x+5}}{Z}}{\frac{N_x}{Z}}=[f(x+2.5)]^5 \ldots . (12)$$

If we begin with $x=147.5$, we have: $\frac{N_{x=147{,}5}}{Z_{c=147{,}5}}=1$.

We therefore obtain:

$\frac{N_{x=152{,}5}}{Z_{c=147{,}5}}=[f(x=150)]^5=0.9934^5=0.96740$.

Further we have this change:

$$\frac{N_{x=157{,}5}}{Z_{c=147{,}5}}=[f(x=155)]^5=0.9807^5=0.90740.$$

$$\frac{N_{x=152{,}5}}{Z_{c=147{,}5}}$$

and consequently:

$$\frac{N_{x=157{,}5}}{Z_{c=147{,}5}}=0.96740\cdot 0.90726=0.87756.$$

If we construct a curve for the various values we can add all ordinates for the whole number abscissae in order to obtain the denominator of the desired probability $w_{c=147{,}5}$ and we obtain $w_c=\frac{1}{49.65}=\frac{1}{50}$

The answer to problem 4 will therefore be: If $S=20{,}000$ subscribers make $C=30{,}000$ calls, then $s=100$ subscrib-

ers make 147.5 calls with the probability $w=\frac{1}{50}$ What does this mean? In 50 cases in which 20,000 subscribers make 30,000 calls, 100 subscribers make 147.5 calls. If then this number of calls represents the traffic load dur-

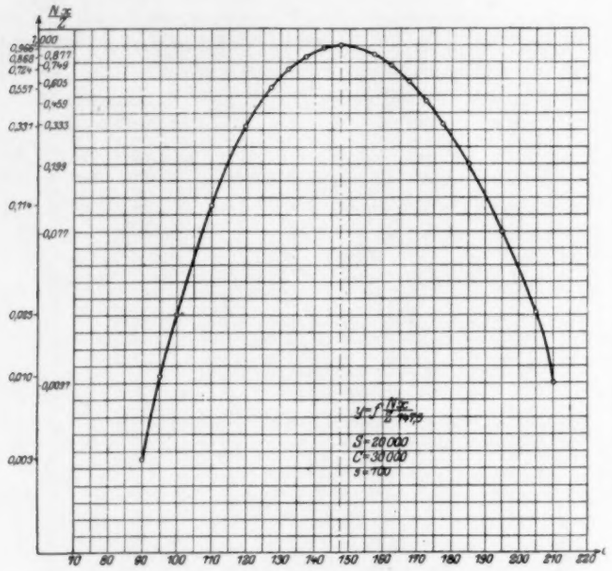


Fig. 1. Auxiliary Curve for Probability Theory.

ing the peak hour of traffic, which occurs daily at least once, then 100 subscribers make these 147.5 calls during the peak traffic hour every 50th day.

This result seems rather unexpected. We feel that these 100 subscribers ought to make these 147.5 calls much more frequently than every 50th day. The reason for the small probability $\frac{1}{50}$ lies in the fact that the theory demands that these 100 subscribers shall make exactly 147.5 calls, neither more nor less. We cannot expect this, and therefore set up a new problem:

Problem 5: If 20,000 subscribers make 30,000 calls, with what probability will 100 subscribers make 147.5 ± 5 per cent calls, in other words from 140 to 155 calls. This problem can be solved with one theorem from the theory of probabilities as follows: "The probability of an event, which is composed of several other factors or events, one or the other of which may occur, is equal to the sum of the probabilities of the various individual events."

Therefore: $w_{c=140 \text{ to } 155}=w_{140}+w_{141}+\ldots\ldots+w_{155}$.

We must therefore compute these individual probabilities w_{140} to w_{155}, as we know only one so far, namely $w_{147\cdot5}$. Let us begin with w_{140} which can be computed with the formula: $w_{c=140}$

$$= \frac{\binom{140+100-1}{100-1}\binom{30\,000-140+20\,000-100-1}{20\,000-100-1}}{\sum_{x=0}^{30\,000}\binom{x+100-1}{100-1}\binom{30\,000-x+20\,000-100-1}{20\,000-100-1}}$$

$$= \frac{\binom{239}{99}\binom{49\,759}{19\,899}}{\sum_{x=0}^{30\,000}\binom{x+99}{99}\binom{49\,899-x}{19\,899}}$$

A comparison of the equation for $w_{c=140}$ with that for $w_{c=147\cdot5}$ shows that the denominator in both of them is the same. That is to be expected, since the denominator is dependent only on the constants C, S and s, which do not change, if we have the s—subscribers make other numbers of calls. From this we can deduce the conclusion, that for the same C, S and s, the probabilities for various c number of calls behave as the numerators of the fractions of probabilities, *i.e.*

$$\frac{w_{c=140}}{w_{c=147\cdot5}} \quad \frac{Z_{c=140}}{Z_{c=147\cdot5}} \ldots\ldots\ldots (13)$$

But how do the numerators stand to each other? The form of the numerator

$$Z_c=\left(\frac{c+s-1}{s-1}\right)\left(\frac{C-c+S-s-1}{S-s-1}\right)$$

is the same as the form of the denominator member N_x, only that in these members we have x instead of c. Since the designation of $Z_{c=140}$ and $N_{x=140}$ are only different expressions for the same parentheses:

$$\left(\frac{140+s-1}{s-1}\right)\left(\frac{C-140+S-s-1}{S-s-1}\right)$$

and since therefore $Z_{c=140}$ is identical with $N_{x=140}$ and since $Z_{c=147\cdot5}$ is identical with $N_{x=147\cdot5}$, then the relation:

$$\frac{Z_{c=140}}{Z_{c=147\cdot5}} \quad \frac{N_{x=140}}{N_{x=147\cdot5}} \quad \text{or also} \equiv \frac{\frac{N_{x=140}}{Z_{c=147\cdot5}}}{\frac{N_{x=147\cdot5}}{Z_{c=147\cdot5}}}$$

But the values of the expression $\frac{N_x}{Z_{c=147\cdot5}}$ are represented in Fig. 1. With the aid of this figure and with equation 13 the probabilities $w_{c=140}$ to $w_{c=150}$ are easily

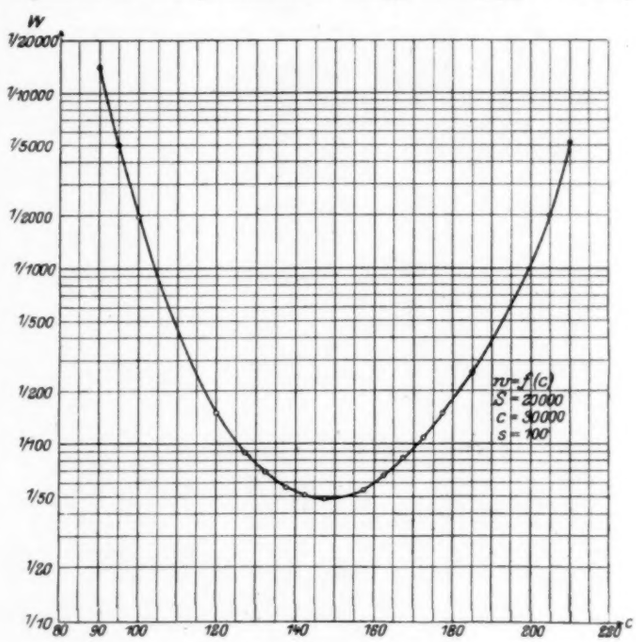


Fig. 2. Probability Curve $w_{c=150}$.

computed. For example: $w_{c=140}=?$ From Fig. 1 we obtain $\frac{N_{x=140}}{Z_{c=147\cdot5}}=0.915$: $\frac{N_{x=147\cdot5}}{Z_{c=147\cdot5}}=1$,

and $\frac{w_{c=140}}{w_{c=147\cdot5}}=\frac{Z_{c=140}}{Z_{c=147\cdot5}}=\frac{0.915}{1}=0.915$,

$w_{c=140}=0.915 \cdot w_{c=147\cdot5}=\frac{0.915}{50}=\frac{1}{55}$

In the same way the other probabilities $w_{c=141}$ and $w_{c=142}$,

etc., are computed. Fig. 2 represents these values. For example: $w_{c=140}=\frac{1}{55}$; $w_{c=147\cdot5}=\frac{1}{50}$; $w_{c=155}=\frac{1}{56}$ we can compute without any serious errors $w_{c=140}+w_{c=141}+\ldots+w_{c=155}=\frac{16}{52.75}=\frac{1}{3.3}$

The solution of problem 5 will therefore be, that if S 20,000 subscribers make C=30,000 calls, then s=100 subscribers make anywhere from 140 to 155 calls with the probability $\frac{1}{3.3}$. If we observe such an exchange we would find about every third day at least one time from 140 to 155 calls made within one of the hundred groups of subscribers. (To be continued.)—F. Lubberger-Mitteilungen a.d. *Telegraphen-Versuchsamt.*

The Channel Tunnel for Telephone Service

SINCE the ending of the war a new impetus has been given to the old question of tunneling the British channel and connecting France and England by tunnel. It may be recalled that this project is not at all a new one and that excavations for this tunnel were made as far back as several decades ago, both in England and in France. On the French side they even penetrated several hundred yards out under the coast from the starting point inland, where the first shaft was sunk, but had to cease operations owing to the objections of the two governments. The great objection of too close proximity between the two nations has now been removed and what immense benefit could have been derived from the tunnel under the Channel during the recent war is easily surmised.

But aside from the greater speed of transportation between the two countries there is an added point of interest to this project which it is well to consider. In a communication reprinted by the *Annales des Telegraphes and Telephones,* Prof. Fleming calls attention to the tremendous value of the tunnel for telegraph and telephone service. With this tunnel completed, direct communication could be had with the European continent to a much larger extent and longer distance than is possible at present. All the inconveniences of the submarine cable would be removed and England and the continent might some day be enabled to enjoy the same success in long distance telephony that we enjoy here in the United States. Owing to the restrictions placed by the nature of things on telephonic communications between England and the continent, which is only possible so far by submarine cable, service in this line has been very restricted. While before the war Berlin was in telephonic long distance communication with Rome, Vienna, Budapest, Stockholm, Copenhagen and with the principal cities of France, Belgium and Holland, Great Britain had to be satisfied with a few lines to the most important cities of France, of Belgium and two or three cities in Switzerland. A telephone cable connecting England and Holland was under construction but was not developed enough to fulfill all the needs of telephonic traffic between the two countries.

Such a tunnel would immediately establish means for rapid and efficient direct telephone connection between England, France and Italy. At the present time there are actually two telephone cables from England under the channel. Each of them has two circuits which are exploited by the phantom method so as to yield three telephone circuits. These cables naturally are subject to deterioration and need frequent repairs which are troublesome and costly. With the construction of the tunnel, telegraph and telephone cable conduits could be provided in it for direct connection with the continent. If these circuits were further extended by the proper pupinized air lines, telephonic long distance service could be established to Italy and even more distant points. From the standpoint of commercial intercourse untold benefits would acrue to English merchants from such direct telephone connections. No doubt but that the construction of such a tunnel will lead to the installation of the most modern methods of housing telephone cables which will make long distance telephone connections more of a reality than they have ever been before in Europe.

Illinois Court Upholds Control

The right of the federal government to take over control of the national telephone and telegraph systems was upheld in an opinion handed down by the Illinois Appellate Court.

The opinion grew out of litigation resulting from the decision of Superior Judge Dever that minority stockholders and not the American Telegraph & Telephone Company controlled the Central Union Telephone Company, a subsidiary concern.

The minority stockholders of the Central Union brought the action to "preserve and protect the assets of the company and to resist by all lawful means any attempt on the part of any person to take over control of the property." The petition also asked that "they be further ordered to desist from further enforcing in Indiana or elsewhere the unlawful telephone rates in violation of the public utilities laws."

Briefly the Appellate Court opinion holds that:

"It clearly appears from the joint resolution of Congress and the proclamation of the President that possession, control and operation of telephone and telegraph systems were taken over as a war measure.

"We think it is clear that power of the government in prosecution of a war (not only in mobilization of military forces, but also mobilization of all resources) is supreme, and since Congress by joint resolution authorized the President whenever he deemed it necessary for national security and defense to take possession and control of telegraph and telephone systems he may do so and in so doing he is not required to get consent of those in possession of property.

"It is obvious that that must be true or the most important part of the resolution would be nullified and success of the war prevented.

"The war power and all powers incident to it reside in the nation's right of self-preservation and the means of enforcing such rights are left to the discretion of the nation and cannot be interfered with at the pleasure of the states or their courts."

The petitioners alleged that in permitting the postmaster general to proceed with federal control, the order of the Superior Court was practically reversed and control practically given back to officials of the American Telegraph and Telephone Company, from whom it was taken.

Concerning this charge the higher court says:

"It cannot be considered in that way. The postmaster general is acting only as the agent of the President under powers granted the latter by Congress."

Telephone Patents Recently Issued

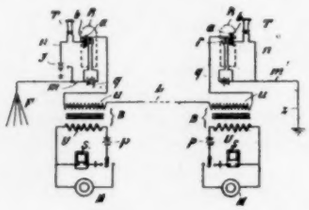
A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

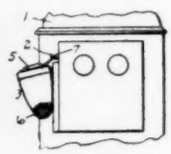
NO. 1,286,855. Automatic Switch. Issued to H. G. Webster, Chicago, Ill. The switch construction comprises a rack upon which are mounted a large number of small switches, arranged in rows vertically and horizontally. Controlling elements are provided for controlling the switches, the controlling elements being common to a number of the switches, and arranged with connecting links to the switches so that any switch may be operated. The object is to provide the large number of switches required for a large exchange, and yet without a large multiplication of expensive controlling elements for each separate switch in the exchange.

1,286,885. Receiver. Issued to William H. Reiss, Cincinnati, Ohio. The telephone receiver is of substantially egg-shape, flattened at the ear end and weighted at the other end, and is incapable of remaining upon a table or flat surface with the earpiece against the table, the weight operating to turn the receiver over. By this design the receiver can give sounds into the room in case it is left off the hook inadvertently, the operator at the central exchange then using the "howler" circuit for calling the subscriber.

1,286,966. System for Meter Service. Issued to John Erickson, assignor to Automatic Electric Company, Chicago, Ill. The meter is located at the central office, and when a call is completed the meter is operated over circuits in any desired or known manner, after which the invention of this patent provides for a further operation of the meter, for a time circuit is connected to the meter circuit and if the conversation is held for longer than a predetermined limited



1,287,180.



1,286,885.

period the meter is operated again, and yet again, repeatedly for each chargeable unit of the time during which the connection continues.

1,286,981, issued to W. H. D. Ford, and 1,286,982, issued to O. F. Forsberg. Calling Devices for Automatic Systems. Both assigned to Western Electric Company, Inc., New York, N. Y. Each of these callsenders is of the pull-dial type, and the patents are limited to the specific mechanical details of the structure.

1,286,996. Automatic Selecting Switch. Issued to C. L. Goodrum and J. A. Kropp, assignors to Western Electric Company, Inc., New York, N. Y. The switch has the general construction of the Strowger switch, with vertical and rotary movements, the brush spindle being propelled by a spring in its movements of selection, and being controlled by controlling magnets in its movements of selection, with means for restoring the spindle and rewinding the spring.

1,287,079. Phantomed Automatic Telephone System. Issued to Frank Newforth, assignor to Automatic Electric Company, Chicago, Ill. In connection with trunk lines which are operated by automatic switches and automatic signal impulses in the usual manner, there is arranged a system of phantom circuits by which manual telephony of speech and signal currents may be passed over the same conductors as over phantom circuits.

1,287,100 and 1,287,101. Contact Bank. Issued to J. N. McReynolds, assignor to Western Electric Company, Inc., New York, N. Y. The contact bank here patented is of the flat type, having a flat surface from which the multiple conductors protrude at intervals, and for which the switch contacts move in straight lines over the surface of the contact bank until they make contact with the desired multiple wires. The bank is constructed by depressing bare wires at intervals into the bank, leaving them high enough for brush engagement between the intervals of depression.

1,287,180. System of One-Wire Transmission. Issued to Cesare Bardeloni, Rome, Italy. The transmission line under this system of telephone transmission is connected at one end through the telephone set to earth and at the other end through the telephone set to aerial antennae. A thermionic device is used in the local circuits of each of the telephones. The system is particularly adapted for use in connection with captive balloons.

1,287,715 and 1,287,716. Automatic Selecting Switch. Issued to F. A. Lundquist, assignor to Western Electric Company, Inc., New York, N. Y. The switch operates with a flat panel of multipled contacts, such as described in patent 1,287,100, reviewed above. A rod carries several sets of brushes (presumably ten sets) and the first set of signal impulses operates to effect the tripping of one set of those brushes that the set may engage the multiple contacts while the other sets do not engage. Then the next set of signal impulses moves the shaft over the contact bank in one direction, after which the third set of signal impulses moves the shaft over the contact bank in another direction, thus obtaining two directions of selection as well as the original selection of brushes, providing thus for three signals, or for selecting one thousand lines per switch.

1,287,992. Party-Line Automatic System. Issued to H. E. Hershey and G. A. Yanochowski, assignors to Automatic Electric Company, Chicago, Ill. In the case of reverting calls, in which the station called for is upon the same line as the station calling, it is customary to remove the busy test from the calling line while testing the called line so that the reversion of the call to the calling line may not find that line busy by test. In the improved system of this patent, the reverting test is made without removing the test potential from the calling line.

Studying Sound Quality

A new branch of the U. S. Bureau of Standards, the Section of Sound Investigation, was organized in August, 1917, and has acquired a first-rate equipment, including the best types of instruments for determining the three distinguishing features of sounds, viz., pitch, intensity and quality. It has also a good assortment of sources of sound and standards of comparison. While the section has devoted much of its time to military problems, including studies in sound-ranging, etc., the apparatus acquired is practically all of it of permanent value for investigations of a general character. The Bureau has installed a Koenig clock fork, the most refined instrument yet constructed for the exact measurement of vibration frequencies of tuning forks. A Webster phonometer of the latest type, for measuring sound intensity, has been constructed for the use of the Bureau under the personal direction of Professor Webster of Clark University, Worcester, Mass. The Bureau has also secured an audion, as used in radiotelegraphy, and a large collection of tuning forks, including a unique and valuable set of thirty-seven forks covering the range from 523 to 4,186 vibrations per second by semitones, specially made for the Bureau by a Chicago manufacturer. At the Bureau itself has been developed a set of "Reed phonometers," similar in principle to Webster's phonometer, but very much simplified and used in considerable numbers, so as to give data for a number of pitches at once instead of only one. For rapid but less accurate determination of the quality of a sound a simplified form of "phonodeik" has been devised. Both the Reed phonometer and the phonodeik have been used in testing the efficiency of several types of muffler for gasoline engines used in aviation

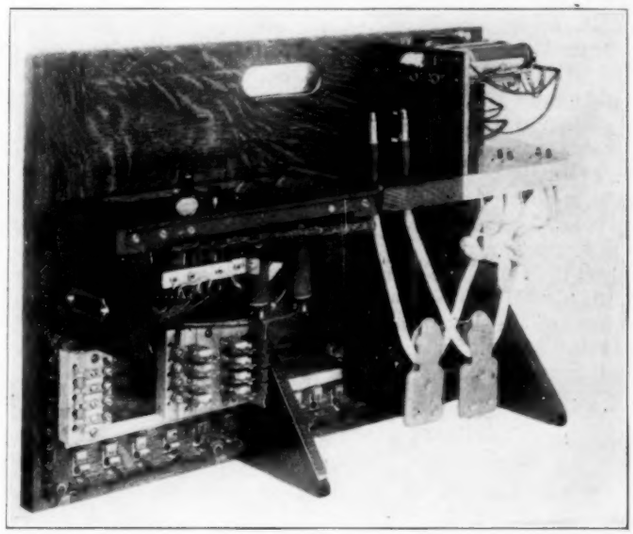
Of Interest to the Trade

What the Telephone and Accessory Manufacturers are Doing to Advance Art

A Unique Magneto Switchboard Demonstrating Panel

Not content with asking managers of telephone companies to take its word for claims made for the No. 105 high efficiency magneto switchboard, the Stromberg-Carlson Telephone Company has made up a number of unique demonstrating switchboards, as shown in the accompanying illustration.

This demonstrating panel contains all of the operating elements used in the Stromberg-Carlson No. 105 switchboard and shows all of the operations and apparatus involved in handling a call from line to line. It is equipped with two complete line equipments, a connecting cord circuit of the company's latest type with zero-loss switching key. The entire equipment is arranged so that it can be placed on a table alongside of a working switchboard and placed in operation to



Stromberg-Carlson Demonstrating Board.

demonstrate the high transmission of efficiency and non-ring-through and sure-ring-off features of the cord circuit in actual service.

Telephone men who are interested in the latest developments in magneto switchboard design can obtain the use of one of these demonstrating panels for testing purposes by applying to any office of the Stromberg-Carlson Telephone Company.

London-Paris "Tapless" Wires

Preparatory to the calling of the Peace Conference, the British Government has laid ten private telephone lines between Paris and London, including cables under the Channel, not touching the system owned by the French Government at any point.

All wires and cables are covered with lead, preventing tapping.—*New York American.*

Kellogg at the Texas Convention

Texas conventions have been steadily improving both in attendance and interest for so many years that the Kellogg Company felt justified in making more than an ordinary exhibit this year.

As a result three complete switchboards were shipped, each representing a distinctive class of equipment. A simple 100-line magneto section of the low-down type showed the "last word" in central office equipment for village and small town exchanges. A three-position demonstrating section showed the wonderful results accomplished through the introduction of automatic features into the highest class of common battery manual equipment. For a full description of this system the reader is referred to the booklet written by the company's chief engineer, H. D. Currier, to whom must be accorded the credit for arousing interest along these lines as well as for most of the results achieved.

However, the equipment of greatest interest to most convention visitors was the Kellogg Universal Switchboard, a complete working model of which was also shown. For a full description of this equipment the reader is referred to the No. 11 bulletin, which explains how this equipment fills that largest and most important gap between the village exchange with its double supervisory magneto equipment and the large town exchange when the "segregation" of the rural traffic and the introduction of automatic features for the purpose of speedier local service becomes available.

Mr. Currier had intended to be present at the convention, but being unavoidably detained at the last moment, his paper, entitled "Service," was read by Mr. Vivian and the large four-man exhibit had to be cared for by State Representative J. A. Stratton and Kansas City Branch Manager H. N. Faris until the timely arrival of "Duke" Cassaday at the end of the second day.

It is generally agreed that the Dallas meeting was one of the best state conventions that has ever been "pulled off" in the west, and those not in attendance passed up something they could ill afford to miss.

Wireless Demonstration

In the near future a series of interesting wireless telephone experiments are to be carried out by the radio department of Rockwell field before the physics classes of the San Diego, Calif., high school and Junior college. B. O. Lacey, head of the science department has made arrangements with Capt. R. J. Heffner, officer in charge of radio at Rockwell field, to have the department temporarily install several of the latest types of army wireless telephone sets at the school. It is planned to have one or more officers from the field explain and demonstrate the workings of the apparatus to the students, and also actually to show the results attained when operating from the ground to the planes. To do this, several planes will hover over the school while the lecture is in progress, the ground set will be tuned in and adjusted and the students given an opportunity to talk to the officers

operating the sets four or five thousand feet above them.

In connection with the wireless telephone, the Rockwell field radio department plans to have, providing that the privilege of visiting the island is made permanent on Tuesday mornings, a portable set rigged up on the field to demonstrate to visitors just what is being accomplished in this direction. A great many visitors last Tuesday were greatly interested in what little they were able to see of the workings of radio telephony, and, in order to gratify this general desire, the portable working sets will be constructed and installed.

Wireless for Forest Rangers

Purchase of 10 wireless telephones for use of fire patrols in national forests of district No. 1, comprising eastern Washington, northern Idaho and western Montana was announced by Roscoe Haines, supervisor of the St. Joe National Forest in northern Idaho, at a conference of large timber owners of the district with forestry officials.

Mr. Haines said the telephones, which he expected to be in operation in the near future, will have a working radius of 25 to 100 miles, and probably will be installed in the more isolated districts, such as the Clearwater and Selway forests.

The lookout man on Mount Hood will be able to talk to Zigzag ranger station over a wireless telephone this summer, according to plans contemplated by C. M. Allen, telephone engineer for the forest service, which involves the establishment of wireless telephone sets on most of the important lookout points.

Experiments with the wireless telephone have proved entirely successful and have caused its adoption by both the army and navy departments. Recent experiments were made with the sets placed on airplanes connected with ground stations, and demonstrated that the stations need not even be stationary.

"The use of the radio telephone will be of great value on our high lookouts," said Mr. Allen, "because of the damage to wires by avalanches, falling rocks and snowslides. In each instance the lookout will be connected to ranger station, which will talk with other stations by wire."

Power for the dynamo will be generated by a windmill or air motor placed upon the tiptop of the cupalo of the lookout house, and the winds that range over the mountain top will do the rest. The motor will be connected with the dynamo, which will be fastened beneath the roof. A couple of vacuum tubes mounted in a box filled with coils, condensers and what-not are the rest of the machinery. These tubes transform alternating current that is fed into space through a short copper wire.

The electrical waves set up on this wire radiate out into space, where they are picked up by similar antenae or wires. This is the principle of the telephone in brief.

While the radio telephone construction program of the forest service includes only the important lookouts, it is expected that radio equipment will in time form a part of the baggage of every forest ranger or fire fighter. The radio outfits would be much lighter to carry than the somewhat heavy and clumsy telephone cases now packed about in the forests by firemen, which, added to the advantage of not having to do with a lot of useless wire, which is always tying itself into knots and getting tangled up in the brush, would be a vast improvement over the regular wire telephone system.

Japanese Engineer Sees U. S. Plants

Yukitomo Yamane, electrical engineer to the Imperial department of communications, Tokyo, Japan, is in this country studying telephone systems and gathering information for use in the establishment and improvement of telephone systems in Japan. Mr. Yamane is making a tour of several cities where he is compiling data concerning the mechanical and managerial systems employed in the United States.

Japan is very far behind in means of communication by wire, Mr. Yamane states, because heretofore the Japanese government has made no appropriations for their development. A comparison between the telephone facilities in Japan and America is an interesting one. In Tokyo, where the telephone system is farthest advanced, there are 50,000 lines in use at present. These accommodate about two million people. In the city of Detroit, where there are close to a million people, there are 150,000 telephone lines.

Telephone installations are extremely hard to get, Mr. Yamane states. It often takes several years to get a telephone installed for the applications so far outnumber the accommodation facilities that it takes a long time for one's turn to come around. Priority rights may be purchased from some one who has made application by paying that person a sum of money for his turn. These rights cost as high as $1,000 if a person wishes to get a telephone immediately. The yearly cost of telephones in Tokyo is $33. This is a high rate indeed, when the wage scale in Japan is only a few cents a day.

The Japanese parliament recently appropriated a sum of 50 million dollars to be spent within seven years on the study and development of telephones in Japan. Mr. Yamane is being sent out and his expenses paid from this fund.

Short Haul Messages

To meet public demand for particular person, messenger and appointment calls on short haul toll messages, and, which in the interest of the public service, it is desirable to furnish, the following schedule is in effect by all companies furnishing telephone toll service: For distance of 12 miles or less station to station rate is ten cents, the completed person to person rate is 15 cents, the completed appointment and messenger rate is 20 cents, the report charge is five cents. The initial period for person to person messages at an initial rate of 15 cents will be three minutes and the over time rate will be five cents for each additional minute.

Airline Rule Modified

The public service commissions have received copies of an order issued by Postmaster General Burleson modifying a previous order establishing telephone rates on an airline hasis. The modification provides that where natural barriers to an air line exist, such as mountains or rivers, the telephone company which has to build around these barriers may return to the old mileage basis for fixing rates, if a proper showing is made to the postmaster general. This modification will be of great benefit to a number of small telephone companies in the West.

Dallas Subscribers Have Choice

Unification of telephone service will be perfected very soon, according to H. C. Bramley, manager of the Dallas, Texas, Telephone Company, who issued a statement outlining the progress that has been made on the engineering work necessary to the physical merger.

A new directory to include automatic and manual telephone numbers is being prepared, and subscribers who now have both are requested to notify the company which they desire to retain in order that their number may be properly listed.

Mr. Bramley's statement is as follows:

"The work necessary to merge the two telephone systems in Dallas is progressing rapidly. It is now thought that before the end of April it will be possible to bring about intercommunication between the automatic and manual subscribers of the Dallas Telephone Company. There were many complicated engineering problems to be solved and difficulty was experienced in getting together necessary equipment and material; however, no effort or expense has been spared in order to bring about the physical merger at the earliest date possible. The work of installing the apparatus necessary for the merger has been in progress for some months, about 125 men being engaged at the present time.

"After the physical merger, subscribers having automatic instruments will dial for automatic subscribers as in the past. If connection with a manual subscriber is desired, central will be dialed and the manual number will be called, the operator completing the connection. Manual subscribers desiring either automatic or manual numbers will call central and the operator will complete the connection.

"A new directory, which will contain the names and numbers of both automatic and manual subscribers, is now in course of preparation. The listings in the new directory will represent about 35,000 stations, being the largest ever issued in Texas.

"It will be necessary for subscribers who now have both the automatic and manual service and who desire to retain only one to advise us which service they desire before the directory is printed, this in order to avoid confusion at the time of and after the physical merger. It is thought that a large number of subscribers, such as business and professional men, will retain both the automatic and manual service, thus having an additional open door for their business to enter. It is also thought that as telephone numbers of both systems have been advertised, the public is conversant with them and has the habit of calling numbers from memory, a large number being accustomed to call over each system, and, for this reason, business subscribers to both systems will desire to retain such a service as will reduce 'busy' report to a minimum."

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

Frank L. Eldridge who for the past four and a half years has been special representative of the Kellogg Switchboard & Supply Company, on April 1 became associated with the French Battery & Carbon Company, of Madison, Wis., as general sales representative in charge of the sale of dry cells. Mr. Eldridge will have offices at 20-24 W. Washington street, Chicago. Cheerfulness, optimism and the aprpeciation of intercourse with his fellowmen are the prime reasons for the success of Mr. Eldridge. "Frank" as he is known to hundreds of Independent telephone men throughout the Central West, was born at Wolcott, Ind., June 23, 1883. When he was ten years old he left his home town for Chicago, the "Windy City," and has been there ever since. In 1902 he started out for the Santa Fe on engineering work. In 1903 he accepted a position with the Chicago Telephone Company in the collection department, where he remained four years. He next was employed in the operating department of the American Telephone & Telegraph Company as special agent, handling adjustments and disputed toll charges. This Mr. Eldridge took care of to the satisfaction of his superiors for over two years. He was then made service inspector, taking care of transmission tests and special work for the operating and commercial department. It was in 1908 that Mr. Eldridge claims he was afforded the opportunity of his lifetime, for the study and appreciation of human characteristics—coming in contact with the big men of the political world at the National Republican Convention, where he worked day and night as representative of the American Telephone & Telegraph Company. In January, 1912, Mr. Eldridge left the American Telephone & Telegraph Company, taking a position as special agent

Frank L. Eldridge.

in charge of the long distance service for the Illinois Tunnel Company, which he represented successfully at the National Republican Convention of that year. In October, 1913, when, as Eldridge says, "the fuse blew," he was appointed secretary of the Central States Telephone Service Association, which later became the service department of the Independent Telephone Association of America. His work for this organization is well known, resulting for him in an extremely wide acquaintance in the telephone field. In 1903 Mr. Eldridge was married to Miss Elizabeth Niles of Chicago. They have five children. While Mr. Eldridge is a confirmed Chicagoan, he has a beautiful summer home at Lauderdale Lakes, Wis.

After a brilliant career of forty-six years in the telephone and allied industries Colonel W. T. Gentry, president of the Southern Bell and of the Cumberland Telephone and Telegraph companies, will retire from office and from business activities on April 14, his sixty-fifth birthday. He was re-elected president of the southern group of Bell Telephone companies at the annual meeting of the boards of directors, and tendered his resignation to become effective April 14. J. Epps Brown, first vice-president of the companies, will succeed Colonel Gentry as president. J. M. B. Horsey, second vice-president and treasurer, will become first vice-president and treasurer. George J. Yundt, chief engineer, will become second vice-president and will assume the operating duties at present performed by Mr. Brown.

B. E. Sunny, president of the Michigan State Telephone Company, also of the Chicago Telephone Company, has been elected a trustee of the Chicago City & Connecting Railways Collateral Trust succeeding E. K. Bolsot.

Edward Bell Field, Sr., president of the Mountain States Telephone & Telegraph Company, died at his home in Denver, Colo., recently, after a long illness. Mr. Field was 69 years old. He was one of the best known capitalists in the Rocky mountain region.

Roy J. Heller, 38, manager of the Bell Telephone Company at Galion, Ohio, died at Bucyrus, recently.

The death of Dr. Clarence J. Blake, a distinguished Boston aurist, on January 28, 1919, marks the passing of one of the pioneers of the telephone business. Although Dr. Blake was never a telephone man, it was with his help that Dr. Alexander Graham Bell perfected his original invention. When Dr. Bell was seeking to introduce his father's system of visible speech into the public schools, in 1871, Dr. Blake, as an expert in voice production and questions of hearing, was asked to meet the committee, and, as he often afterward expressed it, "had the good fortune of meeting Dr. Bell." In 1874 Dr. Bell and Dr. Blake studied the transmission of articulate speech in various ways, and the question of the human ear. At the time Dr. Blake was at the Harvard Medical School he procured a human ear from a dead subject for experiments. It was largely due to Dr. Blake's encouragement and assistance that Dr. Bell carried on his work in making telephony possible.

Robert A. Davis has been appointed commercial engineer of the New England Telephone & Telegraph Company, succeeding Frederick C. Munroe who resigned upon being appointed general manager of the American Red Cross.

F. G. Moore, former manager of the Farmers' Mutual Telephone Company at Clarinda, Iowa, is now managing the Washington Telephone Company at Washington, Iowa, succeeding L. F. Evans, deceased. F. M. Lantz has succeeded F. G. Moore as manager of the Farmers' Mutual Telephone Company at Clarinda.

G. W. Lansing is the manager who in the future will guide the destinies of the Mountain States Telephone & Telegraph Company's exchange at Cody, Wyo., he having arrived recently to assume his new duties. Mr. and Mrs. E. V. Sevey who were formerly in charge returned to the Billings branch and from there will be assigned to a new exchange. Mr. Lansing has recently been released from military service in which he held the commission of captain, and was transferred here from the Hardin exchange.

The election of Samuel Hubbard and George A. Newhall to the directorate of the Pacific Telephone & Telegraph Company to fill the vacancies created by the death of F. W. Eaton, former treasurer, and by the resignation of Frank G. Drum, marked the only changes at a recent meeting. The directors also voted the payment of the regular dividend of 1½ per cent on the preferred stock payable April 15 to stock of record March 31.

E. C. Blomeyer of Waco was elected president of the Texas Independent Telephone Association at the closing meeting of the annual convention. Other officers elected were J. Y. Rust, San Angelo, vice-president; A. J. Combs, Haskell, vice-president; F. W. Greber, Brownwood, secretary; L. S. Gardner, assistant secretary, and Oscar Burton, Tyler, treasurer. Directors elected for the ensuing term were: R. B. Still, Tyler; E. G. Sehrenbach, Llano; Stanberry Alderman, Big Spring; C. A. Shock, Sherman; C. D. Longspeer, Bardwell; Joe Grimes, Gladewater, and J. A. Stratton, Dallas. The new directors held a meeting following adjournment of the convention to map out plans for the ensuing year. The place of next meeting of the association will be determined by the board of directors some time during the coming year. The final meeting of the convention was given over almost wholly to the election of officers, appointment of standing committees and other routine work of this nature.

The call of the farm has proved too much for Manager W. A. Carter, of the Southern Bell office at Salisbury, and he has resigned his place to devote his time to a farm he recently took possession of near the city. Mr. Carter's successor is R. N. Pfaff, who was transferred here from Marion, S. C.

Frank B. Jewett, chief engineer of the Western Electric Company, recently was elected to membership on the Engineering Foundation Board as one of the two trustees representing the American Institute of Electrical Engineers.

Volney Elstun, secretary and treasurer of the Cincinnati and Suburban Bell Telephone Company, has resigned as secretary and treasurer and director after a service of 31 years with the company, it was announced recently. Mr. Elstun has been placed upon the pension list. He is now resting up on a vacation in Florida. At the annual election R. C. Hall was elected a director of the company to fill the vacancy caused by Mr. Elstun's resignation. Mr. Hall, who was assistant secretary and assistant treasurer, has been promoted to secretary and treasurer. Other directors re-elected were: A. J. Becht, Edw. Goepper, B. L. Kilgour, G. W. Lewis, B. T. McBurney, C. P. Taft and Theodore N. Vail.

Mr. Arthur Mayden, who has had charge of the telephone exchange of the Commercial Telephone Company at Carlyle, Ill., for several months, has been transferred to Louisville, Ill., where he will act in a similar capacity for the same company. Mr. Barney Heathman, of West Frankfort, Ill., is in charge of the telephone business at Carlyle.

There has recently been quite a shifting of managers by the Home Telephone Company at Frankfort, Ky. J. A. Chambers, who had charge of the exchange and business of the company here for some years, has been transferred to Russellville, and has been succeeded by H. L. Mason, who has been the company's manager at Bowling Green.

At a meeting of the Michigan Independent Telephone & Traffic Association held in Grand Rapids, February 27, William A. Bahlke of this city was elected as one of the directors of the association.

J. D. Bonnar, for the past four years wire chief of the Ashtabula Telephone Company at Ashtabula, Ohio, has been named as manager of that company, succeeding S. R. Newberry, deceased. W. J. Kinsella, formerly assistant wire chief, has been named to succeed Mr. Bonnar during the illness and following the death of Mr. Newberry has been acting as manager of the company.

Louis O. Sumbardo, aged 49 years, general sales manager of the Southwestern Telegraph & Telephone Company, died recently at his home, 2517 Rush avenue. He is survived by his wife and a daughter, Miss Mercedes Sumbardo; his father, C. L. Sumbardo, and a sister, Mrs. Ava Perry, both of Seattle, Wash.

April 1st will see a change in the personnel of the telephone exchange at Orwell, Ohio. After that time Mrs. Lorena Griffin will be the manager and Max Noble will be located in another business venture, now in process of formation. There will be no radical changes made in the working of the plant here. Mrs. Griffin knows the business from the ground up, and also knows the wants of the people. She will aim to keep the service up to its present high standard. Max Noble leaves the Orwell Telephone Company with a record to be proud of.

Kendall Weisiger, presonal director of the Southern Bell Telephone & Telegraph Company, and Stanley B. Mathewson, former manager of the company in Atlanta, have been commissioned as majors in the officers' reserve corps in recognition of their valuable service during the war as personnel, or trade test, officers. Mr. Mathewson with Colonel Walter Dill Scott and several other personnel officers have formed the Scott company for the purpose of carrying out the trade test idea commercially. They have already been engaged by a number of large corporations. Mr. Weisiger, who has returned to the Southern Bell, has just been elected a director of the National Employment Managers' Association, which is composed of the personnel directors of large corporations throughout the country.

Miss Frances Roselle, who has been with the Home Telephone Company at Excelsior Springs, Mo., ten years, has been appointed auditor and cashier and will supervise the financial department of the Excelsior Springs office. Miss Roselle is one of the most competent and faithful employees of the company and the advancement is in recognition of her efficient service.

Clarence H. Mackay, president of the Postal Telegraph & Cable Company, was removed recently by Postmaster Burleson. The postmaster general issued an order relieving besides Mr. Mackay, W. W. Cook, general counsel; William S. Deegan, secretary of the board of trustees or directors and the owners of the Mackay companies operating the postal systems from all duties appertaining to the control and operation of service under government control. A. F. Adams, president of the Kansas City Home Telephone Company and a member of the general telegraph and telephone operating board, was appointed by the postmaster general to supersede the postal officers in the management of the systems. Mr. Adams presented the order to Mr. Deegan and immediately took over control.

Former vice-president of the New England Telephone & Telegraph Company, Francis A. Houston, died February 10. Mr. Houston gave thirty-four years of his life—practically his entire adult existence—to the development of the business of the New England Telephone & Telegraph Company. He came to it as a young lawyer, recently graduated from Harvard University and the Harvard Law School, and he remained in the harness until last July, when he retired. In the interim he had been assistant general manager, general manager, counsel, treasurer, and vice-president; he had seen the number of employees increase from 500 to 15,000; and he had seen the number of stations on the company's lists increase from 150,000 to over 650,000.

At the annual meeting of the American Telephone & Telegraph Company in New York, William A. Gaston of Boston was elected a director in place of G. D. Milne. It was voted to reduce the number of directors from 19 to 17.

NEWS FROM THE FIELD.

ALABAMA.

Permission to raise its rates is asked by the Pickens County Telephone Company. The request reached the Public Service Commission recently. The company has offices in Aliceville and would raise its rates there and Carrollton, Gordon and Reform. The rates in question are local. The case will be heard before the commission April 7. Heavy expenses, raising cost of material and need for improvement are among the reasons given.

ARKANSAS.

J. E. McKinney, local manager of the Southwestern Bell Telephone Company, announces the company is planning to extend its lines to the outskirts of the city, and many telephones will be installed in East Newport. Owing to conditions arising from the war the company for a long time was unable to make certain improvements. At a later date, Mr. McKinney says, a personal inspection will be made of every telephone in the city for the purpose of maintaining the best possible equipment. He also states that he is making all possible effort to give the city the best of exchange service.

CALIFORNIA.

The San Fernando Telegraph & Telephone Company, operating in Los Angeles County, submits the following figures in its annual report to the State Railroad Commission: Assets $77,624.09; liabilities, $77,-624.09; gross income, $2,842.41; deficit on December 31, 1918, $907.86.

The Southwestern Home Telephone Company, which operates in Hemet, San Jacinto and various points of Riverside and San Bernardino counties and which has its headquarters at Redlands, has applied to the state railroad commission for authority to increase and equalize its telephone rates. The company claims that it must have additional revenue to meet added cost of operation, due to higher wages, increased taxes and higher priced materials. In Hemet and San Jacinto, where the block system is to be continued, the new rate for a main line wall telephone would be $3.25 as against the present charge of $2.25. Temecula, Elsinore, Banning, Beaumont and Redlands rates will be considerably increased if the railroad commission allows the company to make the changes desired.

The annual report of the Reedley Telephone Company, operating in Fresno County, as filed with the Railroad Commission, makes the following showing: Total assets, December 31, 1918, $24,754; operating revenue, $9,913; operating expenses, $8,782; net operating revenue, $1,131; gross corporate income, $1,131; total deductions, $849; net corporate income for year, $282; surplus on December 31, 1917, $1,915; surplus on December 31, 1918, $2,198.

The Corona Union Telephone & Telegraph Company, operating in Riverside County, reports to the Railroad Commission the following figures in its balance sheet for December 31, 1918: Assets, $28,303.84; liabilities, $28,303.84; gross corporate income, $3,417.08.

In the report for 1918, issued by the Pacific Telephone & Telegraph Company, Henry T. Scott, chairman of the board, directs attention to an increase in the number of telephone stations in operation at the end of the year. The total number was 381,900, an increase of 26,882 since December 31, 1917. Expenditures for additions to plant last year amounted to $3,206,-179 and the laying of 48,892 additonal miles of wire brought the total mileage owned and operated up to 2,313,357 miles.

Hayward's joy over a reduction in telephone rates from 20 cents to 10 cents was short-lived. Recently announcement was made that the Hayward telephone rate to Oakland would be ten cents. The new reduced rate was to go into effect on April 1. Now Local Manager John Robinson of the telephone company says that the 20-cent rate will stand. The mistake was caused, he explains, when government officials placed Hayward within the ten-mile radius from Oakland inside of which the ten-cent rate would prevail. This was done by measuring the distance from the Oakland city limits. The rule is that distances between towns is to be measured from the center of each town.

CANADA.

The wireless telephone is to be put to practical commercial use at Montreal, Quebec. Instruments are being installed in the offices of the Montreal board of trade and these will enable brokers to talk with Kingston, Ottawa, Three Rivers and Quebec. It is expected here that ultimately conversations will take place between the board of trade and Ireland over the Marconi Company's wireless plant.

COLORADO.

The citizens of Paoli and surrounding country have been busy of late organizing a local telephone company for their town and adjoining territory with an exchange in Paoli. Four rural lines have been proposed by the instigators of the company and we understand that $1,500 has already been raised toward the enterprise with pledges from many who have become interested in the matter. If the enterprise is launched, it should not be very long until direct toll lines would be installed between Holyoke, Paoli and Haxtun and possibly Fleming. As it now is every call to either of these neighboring towns is relayed through the Sterling exchange.

DELAWARE.

Wilmington druggists do not intend removing the pay station telephones from their stores as the pharmacists in Philadelphia declare they will do on April 1 unless the Bell Company decides to reconsider its decision of reducing druggists' share in the proceeds received from the instruments. E. P. Bardo, general manager of the company's local offices, announced that apothecaries in this city are satisfied with the treatment they are being accorded by the corporation. There are approximately 60 drug stores in Wilmington, Mr. Barbo stated, in which pay stations are installed. Most of these are under what is termed a "standard commission lease." Under this system, for every dollar realized through the use of the slot-machine phones, the druggist gets about thirty cents in compensation for the space which he allows for the purpose. While the telephone company is reducing this rate, Mr. Bardo says it will effect only those stores which are not under the "standard commission." There are but few of these instances, he said, and no objections have been made to his office as yet against the proposed action. It is figured that the step which the Philadelphia druggists intend taking, will cut off 4,000 telephones from the use of the public.

GEORGIA.

Ten local telephone companies have petitioned the railroad commission of Georgia to allow them to increase their rates. The petitions have been filed from time to time in the last several weeks. The petitioning companies are as follows: Metter Telephone Company, Crawfordville Telephone Company, Cairo Telephone Company, Climax Telephone Company, Hahira Telephone Company, City Telephone Company, of Lavonia; Ray City Telephone Company, Fruit Belt Telephone Company, of Fort Valley; Consolidated Telephone & Telegraph Company, of Moultrie, and other south Georgia towns, Hawkinsville Telephone Company.

ILLINOIS.

Joint application was filed recently with the utilities commission for sale by the Mann Telephone Company of Macomb to the Urmaoga Telephone Company of Ursa of its exchanges at Loraine, Lima, Tioga and Ursa, and toll lines between Quincy and those towns and Loraine and Sutter, and for certificate of convenience and necessity for the Urmoga Telephone Company and authority for it to issue $11,-500 capital stock.

The Central Union Telephone Company is anxious to get the increased rates for its service not only to cover the alleged deficit in the operating costs of the Decatur plant, but also to be assured of enough money to start construction on the new telephone building at Church and North streets, planned for the last year but postponed on account of the war. The utilities commission, however, has postponed the hearing on the new rates indefinitely. It is the second time the hearing has been postponed.

The Home Telephone Company of St. Jacob allied for an advance in telephone rates in St. Jacob and Troy.

The Elmwood Telephone Company at Springfield recently petitioned the Public Utilities Commission for authority to issue $30,000 of capital stock.

Directors of the Chicago Telephone Company recently declared the regular quarterly dividend of $2 a share, payable March 31 to stockholders of record at the close of business March 29, to be charged against the compensation which has accrued and which the company is entitled to receive from the United States on account of federal control.

The Morrison Telephone Company has filed with the Public Utilties Commission of Illinois, schedules which will change the rates for toll service between Morrison, Ill., and Erie, Ill., from a free service to a toll charge, in Morrison and Erie, County of Whiteside, and State of Illinois, and that the said change of rates involves an increase in toll between Morrison and Erie of 10 cents for each toll message.

The Chicago Telephone Company has purchased from David W. Miller the fee 532 Federal, 100 feet north of Harrison, 24½x100, east front, for $30,000, being at the rate of $1,200 a front foot and $12 a square foot. This merges the fee with the leasehold, the latter having been bought by the telephone company in February, 1917, from Robert C. Gunnning the origina lessee. The land was under lease from Mr. Miller for nine years from August 1, 1909, at a yearly rental of $1,000 for the first ten years and $1,200 for eighty-nine years, with the lessee having the privilege of buying the fee at the above figure by August 1, 1919. This property adjoins other holdings of the company, all of which, 203 feet, is improved with a seven-story exchange building.

The Rochester Telephone Company filed a petition with the Illinois Public Utilities Commission asking for permission to sell its property to the Central Union Telephone Company.

At the election of officers for the Mutual Telephone Company at Hillsboro held recently the three directors whose term of office had expired were all re-elected. They

are Daniel Pope of Harvel; E. Harris of Coffeen; W. J. Bingham of Bingham.

The Cornell Telephone Company has applied to the Public Utilities Commission for permission to increase its rates. The change involves an increase in the present rates of 25 cents a month, which will be given as a discount if the bill is paid before the fifteenth day of the month after the bill is presented.

H. D. Wagner of Hinckley has bid off the Inter-township Telephone Company at the foreclosure proceedings before the master of chancery. His bid was $10,000.

INDIANA.

Hershell Anderson of Perkinsville has sold the Lapel-Perkinsville Telephone Company property, the only remaining independent telephone system in Madison County, to a group of farmers living in the vicinity of Perkinsville. The stockholders will continue to operate the plant which has a large number of subscribers in the vicinity of Perkinsville and Lapel. The main office will be maintained at Perkinsville.

A petition, signed by twenty-two stockholders, asking an investigation of affairs of the Farmers' Mutual Telephone Company of Millersburg, has been filed with the state public service commission.

Stockholders of the Whitley County Telephone Company and the Farmers' Mutual Telephone Company voted to consolidate the property of both concerns. Each has exchanges at Columbia City, South Whitley, Larwill, Laud, and Etna and the Whitley County Company also has an exchange at Arcola.

William I. Almbaugh, of Sullivan, has purchased the system and franchise of the Merom Telephone Company. The plant formerly was owned by a corporation.

George Davis, manager of the Rushville Co-operative Telephone Company, has announced that the company will continue to charge the service connection charges as ordered by the United States telephone administration, in spite of the order from the Indiana Public Service Commission. Mr. Davis says that the service charges will be refunded in case the service commission wins its case to prevent the enforcement of the Burleson rates.

The Remington Telephone Company of Remington, Ind., petitioned the Public Service Commission yesterday to increase individual residence telephones 50 cents a month and party and rural service 25 cents a month. The petition also asks for an additional charge of 25 cents a month for each subscriber if bills are not paid promptly.

Manager Edward Kneipple, of the United Telephone Company, said it was impossible for him to say definitely at this time the exact amount of money which would have to be refunded to Marion and Grant County people as the result of the order of the Indiana Public Service Commission, to the effect that telephone companies in Indiana must refund to patrons of their toll and long distance service the difference between the regular authorized Indiana interstate rates for such service, and the higher rates ordered by the postmaster general, and also the refunding of all telephone installation charges and charges for moving telephones from one place to another, collected since December 1, but he did not believe the amount would be great. Mr. Kneipple has not as yet received the order from the commission, and of course will take no action whatever until it is received and its exact tener is known.

Petitions for increases in telephone rates in eight northern Indiana cities were filed witm the Public Service Commission recently by the Chicago Telephone Company. The cities affected are Hammond, Gary, East Chicago, Whiting, Highland, Dyer, St. John and Lowell. In each of the petitions the company asserts that an emergency exists and that the rates must be increased and revised, as even in normal times the company has not been able to make money at the present rates. The present rates in East Chicago, Hammond, Gary and Whiting are: Business telephones, individual, $48 a year; two-party, $36; four-party, $24; residence, individual, $36; two-party, $24, and four-party, $18. In East Chicago the utility asks that the business rates be increased to $54, $45 and $39 a year and the residence rates to $33, $27 and $24 a year. In Gary and Hammond the rates asked are: Business, individual, $60; two-party, $48, and a discontinuance of the four-party lines; residence, individual, $36; two-party, $30, and four-party, $24. At Whiting the company asks that the individual business telephone rates remain the same and the individual residence be reduced from $36 to $30 a year. Increases are asked for party line service. At St. John, Highland and Dyer the company asks that two-party and four-party residence service be increased $3 a year and four-party business service be discontinued. An increase of $1 a month for all business telephone service in Lowell is asked and an increase of 50 cents a month for residence service.

At the Central Union Telephone office recently it was stated that an appropriation of $7,000 had been made by the corporation for enlarging the Anderson plant. The company has not sufficient room now and has leased two additional rooms on the fifth floor of the Union building. A new power system and batteries will be installed in the additional rooms. The latest appropriation is to cover power and battery equipment to last the plant until 1925. The Western Electric Company will begin installing the new power plant and batteries within a few days.

The Farmers' Co-operative Telephone Company, which has exchanges at Claypool, Silver Lake, Burket and Packerton, has filed a petition with the public service commission asking that physical connection be ordered with the Commercial Telephone Company of Warsaw. The Warsaw Company has refused to make such connection.

The Hancock County Telephone Company, organized two years ago by farmers when a disagreement arose with the Greenfield Company over switchboard charges was dissolved recently by the Hancock circuit court. The companies came to an agreement several months ago before it was necessary for the new company to start its plans. Charles Hill was appointed receiver to close up the business of the company.

The Public Service Commission recently was petitioned by the receivers of the Central Union Telephone Company for increases in telephone rates at Shelbyville. The utility asks for an increase of the primary business rate from $2.50 to $3.50 a month and the independent residence rate from $1.50 to $2 and a general revision of the rate schedule.

The Public Service Commission of Indiana has authorized the dismantling and discontinuance of the telephone exchange at Buffalo, in White County, which has been operated by the Monticello Telephone Company. According to the petition there were twenty-two subscribers at the Bucalo exchange and for the last three years it has been operated at a loss of $1,500.

The stockholders of the Indianapolis Telephone Company, at their annual meeting recently, elected as directors William Fortune, Louis Hollweg, John H. Holliday, J. K. Lilly, Frank D. Stalnaker, L. C. Huesmann, A. A. Wilkinson, Harry S. New, John N. Carey, Captain Bowman Elder, Ralph A. Lemcke and Foster V. Smith, of Indianapolis; F. R. Huntington and C. Y. McVey, of Columbus, O., and Frederick W. Stevens, of Ann Arbor, Mich. The directors elected officers as follows: William Fortune, president; Louis Hollweg, vice-president; Foster V. Smith, sercetary and treasurer. Members of the executive committee are William Fortune, Louis Hollweg, F. D. Stalnaker, A. A. Wilkinson and F. R. Huntington. E. L. Cline will continue as general manager and F. V. Newman, engineer, as assistant to the president. E. V. Hanes is general auditor.

A hospital at Franklin College in the women's dormitory at Seymour will be equipped and maintained by the Seymour Mutual Telephone Company and its employes in memory of Miss Eva Mahorney. Miss Mahorney formerly worked for the telephone company. When her brother, a member of the students' army training corps at Franklin College became ill of influenza last winter she went to nurse him, became ill and died of influenza.

IOWA.

At a meeting of the Le Clare Independent Telephone Company, at Le Claire, the following officers were elected: President, C. E. Meyer; vice-president, J. A. McFate; secretary, J. V. Pollock; treasurer, J. L. Meyers; trustees, one year, Nattie Wilson; two years, J. J. Ryan; three years, Dr. J. W. Richards.

The Sioux City Telephone Company today announced that a subexchange building costing $7,000, will be erected at Twenty-eighth and Jones streets as weather conditions warrant. It will be used to house equipment valued at $65,000. The new subexchange will be large enough to accommodate 1,500 patrons.

Patrons of the Boone County Telephone Company, will doubtless be pleased to learn that the company is planning on making numerous and extensive improvements on the local plant during the spring and coming summer. The object of which is to give better and more complete service. New and heavier cables as well as wires and a general overhauling of the system is to take place. The company estimates that it will take about $30,000 to fix the job up as it should be.

The several independent telephone companies operating lines in the vicinity of Early have been consolidated and will henceforth be operated as one company which will greatly simplify the telephone situation in that vicinity.

The Iowa-Hilton Telephone Company, at Conroy, purchased the Eighty Line from the Williamsburg Telephone Company recently.

KANSAS.

All the telephone bills of the Hutchinson grain men who claimed that excessive overtime rates had been charged by the Southwestern Bell Telephone Company have been taken up by the telephone company and are being reaudited. It is claimed that the mistakes which were found in the bills for overtime were in all cases in favor of the telephone company. While the auditing of the bills is in progress the telephones are again in use by the grain men, the boycott being declared "off" pending a satisfactory settlement.

KENTUCKY.

Morgan Telephone Company, at West Liberty, has been incorporated. Capital, $10,000; incorporators, C. D. Arnett, W. M. Gardner and Evert Mathias.

LOUISIANA.

A proclamation calling for an election to sound the people of Shreveport on the proposed merger of the Cumberland and Home Telephone Companies will be issued shortly by Mayor Ford. The election will be held April 15, and under the law the proclamation must be issued not more than 20 days in advance nor less than five days. The election, Mayor Ford explained, will be solely to feel the pulse of Shreveport telephone subscribers and will have no effect on the proposed sale of the Home Company franchise. When the Cumberland Company agreed to buy the other franchise its agreement stipulated that the merger must meet with the approval of local subscribers and the April election will be in the nature of a "feeler." The price the Cumberland Company is offering for the Home franchise has not been disclosed, but no hitch in the merger is anticipated on this score.

MARYLAND.

The B. & O. is installing a train dispatching telephone circuit between Cumberland City and Grafton. The circuit has been completed between Cumberland and Terra Alta and will probably be entirely finished and service started to Grafton on March 1. The new link will afford telephone dispatching between Washington Junction, St. Louis, Cincinnati and other intermediate stations. The link between Cumberland and Washington Junction has been in service several months. The telephone dispatching system is being used in preference to the Morse telegraphic service as it has been proven more accurate and satisfactory, although the Morse service has not been eliminated entirely.

MICHIGAN.

Toll line business passing through the Michigan Independent Telephone and Traffic Association for 1917-1918 decreased $1,464.37, compared with business for 1916-1917, according to the annual report presented at the meeting of the association yesterday. The comparative figures are $202,664.75 for 1917-1918, and $204,129.12 for 1916-1917, which gives a decrease of 7 per cent. The loss is attributed to less use of telephones. Some of the companies showed gains in business and other losses. The board of the association decided upon a policy of continued improvement in service for the present year.

The Michigan Independent Telephone & Traffic Association at its annual meeting recently re-elected C. E. Tarte of the Citizens Telephone Company, president, and Roy F. Mapes, this city, secretary and treasurer. W. J. Melchers of Owosso is vice-president. The directorate is composed of C. E. Tarte, Grand Rapids; W. J. Melchers, Owosso; Thomas Bromley, Jr., Muskegon; W. B. Serviss, Saginaw; W. H. Bahlke, Alma; G. L. Hall, Dowagiac; C. G. Fitzsimmons, Reading; A. E. Wells, Grand Rapids; R. C. Smith, Homer; C. S. Smith, Grand Rapids; N. S. Wing, Grass Lake; S. C. Kilpatrick and Roy F. Mapes, Grand Rapids; A. H. McMillan, Bay City, and L. L. Conn, Owosso.

The annual meeting of the Michigan Independent Telephone & Traffic Association for election of officers was held recently. C. E. Tarte was re-elected president and Roy E. Mapes of Grand Rapids, secretary and treasurer.

Notice of the approval of the government of the proposed merger and exchange of territory between the Michigan State Telephone Company and the Union Telephone Company with headquarters at Owosso has been received by both corporations. The merger contract provides that unless a rate increase is granted the companies, either shall have the right to cancel the contract.

Telephone men of Grand Rapids are awaiting the result of appeals by independent companies and the Michigan State Telephone Company to the state supreme court from the injunction granted by Judge Howard Weist of the Ingham court, which discontinued the Burleson toll line rates. Appeals have been made in Ohio and Indiana.

Ionia and Traverse City desire consolidation of the Citizens and Michigan State Telephone companies there, according to the cross bill filed by these cities with the state railroad commission in answer to the petition of the Michigan State Telephone Company for higher rates.

At the annual meeting of the Union Telephone Company held at Alma recently, 94,648 of the 100,000 shares of the company were represented. The directors of the company elected for the coming year were C. T. Babcock of St. Johns, J. H. Fildew of Pontiac, J. T. Millman of St. Johns, W. A. Bahlke of Alma, F. G. Theirs of Mt. Pleasant, E. O. Dewey of Owosso, J. E. Grow of Ovid, J. B. Crawford of Ithaca, J. B. Chapin of St. Johns, L. L. Conn of Owosso, H. L. Kirkland of Lakeview, and A. M. Bentley of Owosso. Following the election of directors, the directors met and elected the officers for the coming year. Those elected were the same as those who held office last year. The officers follow: President, C. T. Babcock of St. Johns; vice-president, J. H. Fildew of Pontiac; vice-president, E. O. Dewey of Owosso; secretary, L. L. Conn of Owosso; treasurer, J. B. Chapin of St. Johns; general manager, W. J. Melchers of Owosso.

MINNESOTA.

The McLeod County Telephone Company, the stock of which is largely owned by farmers, Jay Greaves of Glencoe being the company manager, applied to the state railway and warehouse commission for authority to increase its rates at Glencoe, Lester Prairie, Silver Lake and Brownton. A hearing on the application was held at Glencoe Tuesday and the matter was taken under advisement, decision to be rendered later. The advance in rates which the company seeks is as follows: In the city of Glencoe—Individual line business, $2.50 per month gross; two-party line business, $2.25 per month gross; individual line residence, $1.75 per month gross; two-party line residence, $1.50 per month gross; extension telephones, 50 cents per month net; extension bells, 25 cents per month net; rural (grounded) $18, metallic, $21 per year gross. In Lester Prairie, Silver Lake and Brownton—Individual line business, $2 per month gross; individual line residence, $1.50 per month gross; extension telephones, 50 cents per month net; rural (grounded) $18, metallic $21 per year gross. A discount of 25 cents per month to be allowed from the above rates if payment is made on or before the tenth day of the month following the month in which the service is rendered, except that multi-party rural rates, payable yearly in advance, subject to a discount of $3 if paid during the first month of the year and each month thereafter, the discount to be reduced at the rate of 25 cents per month.

Collecting taxes in Minnesota is not always a profitable business for the state. The gross income tax for 1918, to be assessed against the Hester Union Telephone Company of Hester, is 3 cents. The state auditor had to collect the bill to keep his records correct. A duplicate draft of the bill was drawn up. The original was sent to the telephone company and the copy was turned into the state treasurer. The cost of recording it was $1. The letter to Hester cost the state 3 cents. When the company pays the tax it will be necessary to mail the receipt. Thus the state must pay $1.06 to collect 3 cents.

The Menahga Western Telephone Company held their annual meeting at the Menahga State Bank building on Saturday, February 15, at 10:30 o'clock and elected the following officers for the coming year: President, A. P. Danielson; secretary, Anton Anderson; treasurer, Andrew Karjala. Directors, Caleb Hiltunen, Emil Wennell, James Upwood, Gust Arola, Nels Salo. Managers: Wolf Lake and Midway Line, Anton Anderson; Main Line and Runeberg Line, Andrew Karjala; Green Valley Line, Gust Arola; Hillview Line, Jas. Upwood, Paddock Line, Nels Salo.

The report for 1918 of the Duluth Telephone Company, which was filed recently with City Assessor R. J. Campbell, shows that the company had a deficit of $61,374.77, compared to a deficit of $9,850.23 last year. The increased deficit rested for the greater part on the increase in traffic expenses—from $80,458.40 in 1917 to $122,750 in 1918, a difference of $42,291.60. At the beginning of 1918 the Duluth Telephone Company's book values totaled $2,087,238.57. During the year the property was increased $2,159,575.81 worth. The gross earnings for 1918 were $350,007.90. The capital stock December 31, 1918, was given as $100,000. The report was signed by W. B. T. Belt, vice-president, and J. W. Christie, secretary.

MISSOURI.

A hearing by the Missouri Public Service Commission, with regard to the proposed increase in telephone rates in Hannibal, will be held within the next two weeks. Last fall the Southwestern Telephone & Telegraph Company filed application with the commission for permission to increase the local rates, with the result that immediate protests were filed by the city of Hannibal, Chamber of Commerce

and private citizens. City Attorney Lewis O'Connor has announced that the application will be fought to the bitter end.

The Boonville Telephone Company has taken over the Sew Franklin Telephone Company and consolidated the two concerns. W. W. Kingsbury, the local representative of the Boonville Telephone Company returned from Jefferson City recently with the consent of the Public Service Commission to merge the two lines. The capital stock of the Boonville Telephone Company has been increased from $60,000 to $100,000.

MONTANA.

A new telephone company has been organized by the farmers of the Forest Grove section to extend a line into the country. The new concern is capitalized at $10,000 and expects to build lines in three directions from Forest Grove by fall.

NEBRASKA.

Word has reached the state railway commission at Lincoln that Germans on the Wynot rural telephone line have broken with the Americans, and plan a line of their own to Fordyce, where they can use the German language exclusively.

The Nebraska Railway Commission has authorized the Arapahoe Telephone Company to remove the telephone from the home of C. W. Rector, because he jingled the bell every time he heard German spoken on the line. The commission holds that there are no regulations to prevent German being used over the telephone.

Upon complaint of the Business Men's Association of Pawnee City, the Nebraska State Railway Commission recently entered an order directing the Pawnee Telephone Company to improve its plant. The commission directs the company to install a wire chief temporarily until changes are made to accommodate the service and to increase its number of operators to three.

NEW YORK.

For the year ended December 31, last, net income of the New York Telephone Company was $10,188,561, and surplus after dividends and charges was $2,571,778.

NORTH CAROLINA.

E. P. Hancock, president of the North Star Telephone Company, and others of the company, which owns a private telephone line northwest of the city of Greensboro to and beyond the Battleground, appeared before the city commissioners recently relative to the contract with the city for use of the poles for stringing its private wire to the pumping station at Reedy Fork. A five-year contract has just expired. Mr. Hancock stated the poles would have to be replaced and suggested that the city bear part of the cost of putting up the poles and become half owner in the line for the distance it uses the poles. Then half the revenue derived would belong to the city. It was agreed to put in cedar or chestnut poles, not less than four inches in diameter at the top. the city to put in half the number required to the point where its wire leaves the company's line. Each party has control of the upkeep of his individual wire.

NORTH DAKOTA.

The local commercial club has petitioned the Northwestern Telephone Company to extend toll line connections between Grenora and Minot.

The Buffalo Creek Telephone Company was reorganized recently in Lightning Creek township and will follow the rural mail route southwest of Bucyrus as far as the Hans Stadheim farm. The officers of this company are David Davidson, president; Albert Solseth, vice-president; John M. Hanson, secretary, and Wm. Ladson, treasurer with Hans Skogen as the fifth director. A new company was organized by A. O. Brown at Reeder, Friday afternoon which will be known as the Lightning Telephone Company, with Wm. Holmquist as president. This line will run out of Reeder due south to Ben Benson's and west to Wm. Holmquist's. It is very probable that a line will be extended on into South Dakota to reach Penville and Ralph which are all tributary to Reeder. Inasmuch as all of these farmers had their business interests at Reeder it was deemed best to organize this new company to terminate at the Reeder exchange.

The state railroad commission has been advised that an action has been instituted in district court at Grand Forks by the Northwestern and Tri-State Telephone companies asking that the commission's demand for a physical connection between the two properties be set aside. The district court has temporarily suspended the operation of the commission's order, pending an investigation of the merits and legal aspects of the case.

Manager Brown, of the Griggs County Telephone Company, has completed negotiations for the purchase of the McHenry Telephone Company, comprising the exchanges at McHenry, Grace City, Juanita and Glenfield, together with the toll and rural lines in that territory. Mr. Brown intends making extensive improvements on the line between Binford and McHenry, and at other points also where necessary, thus giving his patrons the best possible telephone service.

OHIO.

The state public utilities commission recently fixed the final valuation of the Cleveland property of the Ohio State Telephone Company at $4,080,228. Against the wishes of the company, the commission eliminated an item of $108,000 for cost of attachment from the valuation. This was done at the instance of the wishes of the city. Rates will be based upon the valuation announced.

Mandamus proceeding restraining the Berkey Farmers' Mutual Telephone Company, of Berkey, Ohio, from conducting telephone service and installing telephones in Richfield Center, was asked by the Sylvania Home Telephone Company in Common Pleas Court recently. The petition alleges the Berkey Company has installed over 70 telephones in the territory of the Sylvania Company, causing it to lose more than 50 of its 250 subscribers.

Elyria Telephone Company at Elyria has put into operation its new automatic service.

The Farmers' Mutual Telephone Company at Belmore held their regular annual meeting recently and elected the following officers for the ensuing year: President, Wm. George; vice-president, William Nash; secretary, Chas. Wickham; treasurer, David Ensminger; lineman, H. Speaker; manager of central office, Alice George.

An automatic record in the telephone exchanges, of telephone calls on party lines, will be recommended to the City Council next Monday by the special council committee investigating complaints about telephone service in Cleveland. This, members say, is the only way to eliminate overcharges. Company officials will act on recommendation of council, says Committee Chairman Caldwell.

The annual report of B. L. Kilgour, president and general manager of the Cincinnati and Suburban Telephone Company, read at the annual stockholders' meeting recently recites for the most part the condition under which the government assumed supervision of the telephone lines of the country. The report further shows that 107 employees of the company entered military service, many of whom are still at the front. The report says in part: "The year 1918 witnessed the highest traffic peak in telephone history. This together with serious losses in our operating forces due to the epidemic of influenza and the high turnover of labor, complicated our operating problems, but we feel that the situation was met successfully and that in the coming year conditions will tend more toward normal. The company's proportion of the payment by the government will enable it to meet its charges for dividends. While the company remains in control and possession of the government, information regarding its operation is at the disposal of the postmaster general and the usual balance sheet and income statement is omitted." There are 95,713 telephone stations in Cincinnati, which is a gain of 3,174 for the year.

A complete census of telephones in use by the patrons of the Ashtabula Telephone Company is being taken and is very nearly completed. When it is finished, the officials of the company will have in their hands not only the exact number of telephones in use, but also the style of each telephone the condition of each, and also facts in connection with various parts of the telephone which need replacement from time to time, enabling them to know at a glance just what style of mouthpiece, receiver, cord, etc., is required to repair any style of telephone in use here. The census, which has been interrupted to some extent by the influenza epidemic, has been in progress since December. It is the first ever made here. Telephone officials say that the company now has 4,040 telephone patrons, using 4,353 telephones. This is a gain of 184 telephones over this time last year. Figures for December, January and February just past show a gain of 51 telephones, of which number, 24 were added during February, 18 during January, and 9 during December.

The Public Utilities Commission of Ohio recently announced the result of valuation of the Toledo property of the and fixed that value at $3,017,825.77. The city, through Accounts Commissioner John J. Higgins, months ago was given access to the company's books, and fixed the valuation thereon at $2,996,115. This shows a difference between the city's valuation and the Public Utilities Commission of only about $22,000. The new schedule of rates, however, applied for by the company last spring, went into effect by order of the utilities commission as of December 1. This schedule made

an average advance of about 16 per cent. Manager George Ford of the company said that the announcement of the valuation didn't mean a thing. However, the city may now expect the utilities commission, with its valuation in hand, to adjust the new rates in keeping with the valuation. Mayor Schreiber, Law Director Emery and Accounts Commissioner Higgins fought against the increase for the city administration. "The city figured that the company was making just about as much money as it did before the war, and that it was not entitled to the increase," Accounts Commissioner Higgins said. "Our valuation was not far wrong." An item of $71,761 urged by the company to be included in the valuation for the cost of attaching new business, was denied by the commission in its valuation.

Claude Ashbrook, local broker, has been elected a director of the Ohio State Telephone Company, giving Cincinnati three men on the board instead of two, as formerly. This arrangement met the wishes of the Cincinnati stockholders. Walter Brown, of Toledo, was the other new member elected to the board. Mr. Ashbrook said recently the prospects of the company are very good, but that he does not favor any dividend on the common stock at the present time.

Application was filed with the Ohio Public Utilities Commission recently by the Cincinnati and Suburban Bell Telephone Company for authority to purchase and to consolidate the properties of the Felicity Home Telephone Company in Washington and Franklin townships, Clermont county. The consideration was not given.

The first wireless telephone to be installed in Cleveland for practical use will be placed in crib No. 1, one mile out in the lake, according to an announcement made by Water Commissioner Martin recently. The apparatus will be modeled after the Glenn L. Martin airplane telephone, and if it proves successful a similar telephone will be installed at the other waterworks cribs. Heretofore the only means of communication between crib workers and their employers was by tug.

Stockholders of the Ohio State Telephone Company recently elected Claude Ashbrook, a broker of Cincinnati, a director to succeed S. G. McMeen, who is detained in the South on account of ill health. Walter F. Brown of Toledo takes the place of the late Clarence Brown of Toledo. Other directors were re-elected. President C. Y. McVey and all other officers were re-elected. A satisfactory financial statement was presented, covering seven months' operation by the company and five months' operation by the government.

The Amherst Telephone Company recently commenced to cut in for the third operator to take care of the increased calls by telephone users. Amherst now have almost 700 telephone users, the number having doubled in the past few years.

A demand by the Bell Telephone Company of Fostoria for a twenty-five cent increase in telephone rental has met with opposition on the part of W. M. Witherspoon, city solicitor, who recently issued a warning against paying the increase and announced that he would appeal to the city council for permission to begin suit to prevent the increase.

The scheme of the Ohio Electric for renewing the old telephone poles in Lima on Main street with steel ones and placing the new boulevard lights on them has fallen through, as the property owners have told the Ohio Electric that the petition which has been accepted as an ordinance by council, and which cannot be changed calls for separate poles.

OKLAHOMA.

Fines of $11,500 were assessed against the Southwestern Bell Telephone Company by the corporation commission February 20 for alleged contempt in putting into effect rates ordered by Postmaster General Burleson. The fines are $500 a day for every day the rates have been in effect, according to the reports from Oklahoma City.

OREGON.

Forty-one telephone users in the northwestern part of Salem have signed a statement to the public service commission in which they declare that if the rates of the Pacific Telephone & Telegraph Company are increased they will discontinue their telephones. They say that with the victory loan coming up they will be unable to bear many further financial burdens.

SOUTH DAKOTA.

It is planned for local committees to raise a total of $4,000, which will be given as a bonus to the farmers of Lemmon who recently organized a rural telephone company, with the object of constructing several rural lines, which will be connected with the Lemmon system. This arrangement will prove of mutual benefit to the farmers and to the business men and other residents of Lemmon, and therefore it was decided to assist the project in a substantial way. More than $3,000 already has been contributed to the fund.

Establishment within the next 60 days of a permanent telephone operators' school under a competent instructor is planned by the Northwestern Telephone Company at Sioux Falls, it is announced by M. E. Guinter, local manager. This project has as its purpose the maintaining of service at its highest possible standard. Work hitherto done by a corps of supervisors, which has been found not entirely satisfactory, will be superseded under the new arrangement which will, it is hoped, establish a reserve of competent relief operators. The company now has nearly 100 operators on its payroll in this city. Removal of the traffic office to the main floor of the building is contemplated, the district accounting office having been transferred to Minneapolis. This will leave vacant the third floor, Ohio State (Home) Telephone Company, now the traffic room, which can be used for the school. No changes are contemplated in the system for the present, according to Mr. Guinter, except to make necessary improvements in the service. The company has disposed of its interests in many of the local lines formerly controlled.

A privately owned telephone line 30 miles in length to get individual service to their ranch is being constructed by Beisigl Brothers, extensive ranchers in the Lemmon section of the state. After waiting several years for some telephone company to build into their section, and none coming, they have purchased the wires and poles for 30 miles of line and will put in their own service line to the nearest telephone connection they can get. This probably is the longest individual service line, which has ever been put in this part of the country, to get a chance to transact daily business with the world.

TENNESSEE.

The capital stock of the People's Telephone & Telegraph Company at Knoxville will be increased from $30,000 to $120,000, following an application for an amendment to the charter of the corporation, filed recently.

An application to the amendment of the charter of the People's Telephone & Telegraph Company, at Knoxville, asking that the capital stock be increased from $30,000 to $120,000, was filed with the county court clerk Thursday. The application was filed by S. B. Luttrell, J. C. Duncan, H. B. Branner, Asa Hazen and C. E. Luckey.

TEXAS.

The Southwestern Telephone Company and the San Marcos Telephone Company have reached an agreement whereby the San Marcos Telephone Company takes over the plant at this place of the Southwestern Company and also the Martindale exchange. Terms and a probable raise in rates will be laid before the city council and submitted to the postmaster general for approval. If approved, the deal will be closed at once and within the next two months the details of taking over the outside construction and connecting all telephones with the switchboard in the home company's office will be completed.

At a meeting of the city council of Georgetown recently to which the citizenship of Georgetown had been invited the matter of granting the local telephone company an increase in rates was taken up. Representatives of the company presented a statement on which the increase in rates was based and discussion as to the receipts and disbursements were very frankly made by both sides. After hearing the statement of the company the council voted unanimously to reject the petition. The Georgetown Telephone Company is a private corporation owned jointly by Mrs. J. M. Daniel of Georgetown and Fred B. Robinson of Waco, and is operated under a franchise granted in 1898. The council requested Mayor John D. Hudson to file a protest against the proposed increase in rates with the federal director.

The Haskell Telephone Company in Olney, is one of 42 exchanges operated by the company whose headquarters are located in Haskell. The Olney office has 600 telephones connected up of which 200 are located in the city and balance on the 20 rural lines emanating in all directions from the central office. The central office is equipped with a 300 capacity drop switchboard and four operators are employed to handle the calls. The company owns and operates 19 toll lines out of the city and a 24-hour service is maintained. John M. Paschall, the local manager of the company has been in charge for the past two years as manager but has been connected with the company for nine years. The Haskell Company is the largest independent telephone company in the state and has built up an excellent system.

A check for slightly more than $17,000 was received by the city tax department

recently from the Dallas Telephone Company, in payment of the 4 per cent gross receipts tax of the Automatic Telephone Company up to October 1, 1918, and the 4 per cent tax of the new company from October 1 to December 1, 1918.

A depreciation charge of $115,936.10 for the six months ending December 31, 1918, is the outstanding feature of a report of the Southwestern Telegraph & Telephone Company filed recently. The report shows that the company's gross earnings in San Antonio during the six months ending December 31 amounted to $423,848.37, and after deducting all expenses and depreciation of the net returns were only $28,853.21. The report is the first filed by the company under the terms of an ordinance passed by the commission when the higher telephone rates were put into effect last summer. It shows that the company's net earnings before deducting depreciation amounted to $144,806.61, and the depreciation charge of $115,936.10 in six months' time, brings the net returns down to only $28,853.21. Revenue from exchange service is placed at $382,328.65, from toll service $32,416.27, miscellaneous revenue $8,103.46, total $423,848.37, less licenses fees and rights of $18,226.87, amounting to revenue from operating expenses of $404,621.50. Total expense including maintenance, traffic, commercial and general expense is put at $215,904.22, which is further increased by deductions for anticipated taxes, rents on exchange, etc. The depreciation charge of $115,936.10, is claimed by city officials to be one of the biggest ever made by a public service company in a report covering a period of six months. The value of the company's holdings in San Antonio are assessed at $2,673,803.

More than 100 experts from factories of the Western Electric Company are in Dallas installing cables and special equipment for the Dallas Telephone Company which is essential to the physical merger of the two systems. Cables containing 1,800 wires are being laid between exchanges and exchange boards are being connected.

VIRGINIA.

Motley Telephone Company, Hurt, Capital, $5,000. R. D. Adkins, president; B. H. East, secretary. To operate a telephone system in the counties of Pittsylvania and Campbell.

WASHINGTON.

Approximately 44 miles of telephone lines will be built in the Wenaha forest reserve this year. Plans outlined by Forest Supervisor J. C. Kuhns have been approved by Charles H. Flory, assistant district forester in charge of operations in the northwest. Ten miles of the system from Toll Gate to Mottet Meadows will be constructed some time this spring. The remaining 34 miles await only the indorsement of the department. The line will extend from Mottet Meadows to Long Meadows, where it will connect with the Dry Gulch ranger station near Troy, Oregon. The telephone system will be used principally for fire protection as well as to facilitate business between livestock men and forestry officials.

The Pacific Telephone & Telegraph Company raised its rate for suburban telephones in Omak from $1.50 to $3 a month March 1, and to date most of the country instruments have been ordered out. It is necessary that local orchardists have wire connections with town, the depot and the apple warehouses and there is a movement on foot to organize an independent company to handle this business.

Seattle and Tacoma will join in an attack on the recent decision of the Public Service Commission authorizing an increase in telephone rates in this state. This has been decided at a conference between Assistant Corporation Counsel T. J. L. Kennedy and U. E. Harmon, city attorney of Tacoma. The complaint is being prepared and will be filed in the Thurston County Superior Court in a few days. The attack on the Public Service Commission ruling is to be made on two principal grounds. The first is that the decision of the commission was based on heresay testimony; the second is that the telephone system in this state, being under the control of the United States government, the commission is without authority to fix rates. It is contended that while the telephone service in this state was provided by the Pacific Telephone & Telegraph Company, a private corporation, rates, but the law gives the commission no authority to fix rates for the state or the United States.

The Cowlitz Prairie Telephone Association has purchased the line of the defunct Home Telephone Company running from the Cowlitz prairie store into Winlock. There are only a few telephones on the line, but the new owners expect to make it a paying venture.

C. E. Hickman, divisional commercial superintendent of the Pacific Telephone & Telegraph Company, recently told of $16,790 to be expended in telephone betterments between Davenport and Reardon and Coulee City and Wilbur on the Waterville-Spokane lead. Mr. Hickman said: "Reconstruction of that portion of the Waterville-Spokane toll lead between Davenport and Reardon, 13.1 miles, by replacing, resetting or restubbing defective poles and entirely rebuilding that portion between Reardon and the Spokane-Lincoln County line, 4.1 miles, will cost $14,420. It is also proposed to replace two present No. 9 iron circuits with No. 12 copper between Reardon and the Spokane-Lincoln County line. The general reconstruction of that portion of the Waterville-Spokane lead between Coulee City and Wilbur, including the lead to Wilson Creek, by replacing, stubbing or resetting of defective poles and placing same in good repair, will cost $2,370. This is the first of considerable repair and extension work to be undertaken by the Pacific Company this year."

WEST VIRGINIA.

The Grassy Meadows Farmers' Telephone Company, of Grassy Meadows, W. Va., has been incorporated to operate a telephone line in Greenbrier County, capital stock $2,496; incorporators, C. E. Patterson, C. W. Sweeney, R. E. Kenney, J. E. Leef and J. L. Duncan, all of Grassy Meadows.

Train dispatchers' telephone circuit service on the Baltimore and Ohio Railroad between Martinsburg, Keyser, W. Va., and Grafton, W. Va., has been perfected, the link between Cumberland and Grafton having just been completed. The handling of train movements by the new telephone system, instead of the old Morse code, will be increased 25 per cent in efficiency.

WISCONSIN.

At the annual stockholders' meeting of the Wiscosin Telephone Company recently all the present directors were re-elected for the ensuing year. They are: Otto H. Falk, Julius O. Frank, O. C. Fuller, H. O. Seymour and Edward A. Uhrig, Milwaukee; Bernard E. Sunny, Alonzo Burt and H. F. Hill, Chicago; Theodore N. Vail and B. N. Bethell, New York, and C. Jay French, Boston. The election of officers will be held at the next meeting of directors on March 27.

A deal has been closed whereby Fred H. Karman has become owner of the majority of the stock in the local telephone company at Hawkins. Mr. Karlman is president of the company and will also be general manager, devoting his entire time to the business. The services will be greatly improved. Heretofore the men in the company have devoted but part of their time to the enterprise with the result that the service was not of the best.

When the independent telephone company bought out the plant of the Bell company in La Crosse it added 330 subscribers to the independent list, paying $33,919 for the plant, with $106,000 for lines, cable and conduits. These figures were among those presented by the company to support its demand for increased rates in a hearing before the railroad commission.

The stockholders of the Knapp Telephone Company held their annual meeting recently. The officers of last year were re-elected, as follows: Colonel Cole, president; George Purvis, secretary and treasurer; Henry Jodell, James Casey, George Shafer and George Hart, directors. The telephone company was found to be better off financially than in previous years and it was decided that a dividend of 6 per cent should be paid on stock. The question arose as to whether it would not be a more paying proposition to buy property for the telephone office than to continue paying rent. This was left to the directors to decide.

The officers of the Farmers' Telephone Company held a meeting at Lancaster recently and tried to buy out the Bell company, but did not succeed in so doing. The Farmers' company expect to erect an up-to-date building at Lancaster with all the latest improvements, also a fireproof building.

The special meeting of the Fennimore Mutual Telephone Company held in Fennimore recently proved a lively affair and called out an attendance of over a hundred stockholders. By a vote of 127 to 45 it was voted to dissolve the old mutual company and change to a stock company and the officers will now go ahead with the necessary proceedings to make the change. The company, under the change, will be placed on a better business basis, stockholders will be issued new dividend paying stock and it will be possible to pay off the existing debts. The discussions were lively and brought out some good points. Wm. Frankenhoff presided and Geo. C. Howell acted as clerk of the meeting.

The Eagle River Telephone Company at Rhinelander has been authorized by the railroad commission to increase the rentals on telephones.

Fifty farmers from Mt. Horeb, Black Earth and vicinity appeared before the Wisconsin Railroad Commission recently to protest the application for an increase of rates, tolls and charges made by the Mt. Horeb Independent Telephone Company at the hearing December 10.